FEBRUARY, 1954

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GYNECOLOGY AND OBSTETRICS

Section

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CONTENTS—FEBRUARY, 1954

COLLECTIVE REVIEW

The Treatment of Perforated Peptic Ulcer by Primary Gastric Resection. HORACE G. MOORE, JR., M.D., HENRY N. HARKINS, M.D., F.A.C.S., and K. ALVIN MERENDINO, M.D., F.A.C.S., Seattle 5, Washington 105

ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

Head

Discussion on the Management of Injuries of the Nose and Upper Jaw. E. G. COLLINS, D. S. MIDDLETON, and Others 124

What is the Value of the So-Called Prophylactic Neck Dissection in the Treatment of Carcinoma of the Oral Cavity? MARCEL DARGENT..... 124

A Technique of Immediate Bone Grafting in the Treatment of Benign and Malignant Tumors of the Mandible and a Review of 17 Consecutive Cases. JOHN J. CONLEY..... 125

Eye

Reconstruction of the Lower Fornix by a Pedicled Graft from Skin of Upper Lid. K. N. SHUKLA. 125

Nystagmus Electrically Recorded. HELGE HERTZ and NIELS RISLAER..... 126

Vascular Lesions of Diabetes Mellitus. JOSEPH I. GOODMAN..... 126

Geniculocalcarine Injuries in War Casualties. NORMAN S. JAFFE and LLOYD S. DURKIN..... 126

Minimal Amount of X-Ray Exposure Causing Lens Opacities in the Human Eye. DAVID G. COGAN and KNUD K. DREISLER..... 126

Complications Following Cataract Extraction. A. A. CINOTTI and JERRY HART JACOBSON..... 127

An Unusual Type of Degenerative Retinopathy. HUGH C. DONAHUE..... 127

Modification and Defense of the Scleral Implant. W. HEDLEY SUMMERSKILL..... 127

Nose and Sinuses

Osteoma of the Nasal Sinuses. F. K. KESSEL..... 128

Neck

Study of the Role of Thyroid Secretion in the Evolution of Cancer by Clinical Documentation. M. DARGENT and J. LAVIGNE..... 128

Relationship of the Age of the Patient to the Natural History and Prognosis of Carcinoma of the Thyroid. GEORGE CRILE and JOHN B. HAZARD.... 128

Tumors and Hyperplasia of the Parathyroid Glands. LEWIS B. WOOLNER, RAYMOND KEATING, JR., and B. MARDEN BLACK..... 129

Bilateral Polypoid Granuloma of the Larynx Following Endotracheal Anesthesia. D. IOANNOVICH..... 130

Primary Tracheal Tumors in the Infant and Adult. JOSEPH G. GILBERT, LAWRENCE A. MAZZARELLA, and LOUIS J. FEIT..... 130

Diagnostic Radiological Aspects of Hypopharyngeal Cancer. SOLVE WELIN..... 200

Radiumhemmet's Method of Treatment in Hypopharyngeal Cancer. SVEN HULTBERG..... 204

Dissection of the Neck after Intensive Irradiation to the Neck. Its Feasibility in the Management of Cervical Metastasis from Oral Cancer. S. GORDON CASTIGLIANO and C. JULES ROMINGER.... 205

SURGERY OF THE NERVOUS SYSTEM

Brain and Its Coverings; Cranial Nerves

Management of Intracranial Arterial Aneurysms. HOMER D. KIRGIS and DEAN H. ECHOLS..... 131

Diagnosis and Surgical Treatment of Cerebral and Meningeal Tuberculosis. F. PAMPUS..... 131

Hazards of Lobotomy. Study of 2,000 Operations. WALTER FREEMAN..... 131

Meningiomas of the Base of the Cranium: Clinical and Surgical Consideration. C. AMBROSETTO.. 132

Surgical Support in Permanent Facial Paralysis. C. R. MCLAUGHLIN..... 198

Spinal Cord and Its Coverings

The Treatment of Traumatic Paraplegia in Fractures of the Lumbodorsal Spine. IAN LAWSON DICK. 133

Chordomas. A Review of 19 Cases of Chordomas Including 5 Vertebral Cases. JOHN H. W. BIRRELL 134

Peripheral Nerves

Twenty-Five Operative Cases of Intrathoracic Nerve Tumors. E. HUSFELDT and M. GERNER-SMIDT. 135

SURGERY OF THE THORAX

Chest Wall and Breast

Management of Carcinoma of Breast. R. WANKE... 137

Sarcomas of the Breast. ELIE MONNOYER..... 138
Fibroadenoma and Cystosarcoma Phylloid of the Breast. UGO NARDUCCI and FRANCESCO SQUARTINI..... 138

Trachea, Lungs, and Pleura

Chemically Treated (Lyophilized) Tracheal Grafts. FRANCESCO NATELLIS..... 139
The Technique and Use of Segmental Resection in Pulmonary Tuberculosis. E. DERRA, H. FRANKE, and H. RINK..... 139
Surgical Treatment of Tuberculosis by Pulmonary Resection. ALFRED DUMONT and D. HONORÉ.. 140
Focal Lymphogranuloma (Pulmonary and Cerebral Lesions). E. VINDIGNI..... 140
The Value of Tomography in Examination of the Intrapulmonary Bronchi. HERMAN LODIN..... 200

Heart and Pericardium

Transposition of the Great Vessels. JOHN D. KEITH, C. A. NEILL, PETER VLAD, R. D. ROWE, and A. L. CHUTE..... 141

Esophagus and Mediastinum

Narrowing of the Trachea and the Esophagus by Congenital Malformation of the Mediastinal Vessels and Their Management. H. KRAUSS... 141
Benign Tumors and Cysts of the Esophagus. A. P. STOUT, G. H. HUMPHREYS, and R. L. MOORE.. 142

Miscellaneous

Twenty-Five Operative Cases of Intrathoracic Nerve Tumors. E. HUSFELDT and M. GERNER-SMIDT. 135
Correction of Scoliosis by Spreading of the Ribs. WILLI FELIX..... 143
Streptokinase and Streptodornase in the Treatment of Hemothorax and Pyothorax and Acute and Chronic Suppuration in Other Sites. GIUSEPPE D'ASTE and GIO-BATTA CERRUTI..... 193

SURGERY OF THE ABDOMEN

The Treatment of Perforated Peptic Ulcer by Primary Gastric Resection. Collective Review. HORACE G. MOORE, JR., M.D., HENRY N. HARKINS, M.D., F.A.C.S., and K. ALVIN MERENDINO, M.D., F.A.C.S., Seattle, Washington..... 105

Gastrointestinal Tract

Profuse Mucosal Hemorrhages on a Neurovascular Basis: Clinical and Experimental Observations. W. WACHSMUTH..... 144
Jaundice After Gastric Resection. LUIGI PARODI and ENZO CAPPELLINI..... 144
Regeneration of the Gastric Mucosa. G. LEVANDER 145
Acute Intussusception. DON L. THURSTON, JEAN HOLOWACH, and ERNEST E. MCCOY..... 145
Diverticulitis. O. V. LLOYD-DAVIES..... 146
Results of Treatment of Acute Small Bowel Obstruction. JOHN A. BOLLINGER and EDSON F. FOWLER 146
Primary Resection of the Colon in Acute Ulcerative Colitis. CHARLES B. RIPSTEIN..... 148
The Present Therapy of Carcinoma of the Rectum. O. GOETZE and F. STELZNER..... 149
Surgery of Rectal Tumors. J. PI-FIGUERAS..... 149
The Internal Anal Sphincter. Its Surgical Importance. STEPHEN EISENHAMMER..... 150
The Treatment of Injuries to the Anus and Rectum. DON W. MCLEAN and WARD SMATHERS..... 150
Further Studies on the Early Diagnosis of Cancer of the Stomach. GIOVANNI SANQUIRICO and NICOLO MINUTO..... 201
The Roentgen Diagnosis of Bleeding Lesions of the Small Intestine. ANDREW P. DEDICK and LOIS COWAN COLLINS..... 201
Duodenal Stenosis Resulting from Arterial Compression. FRANCO FUGAZZOLA..... 201
Differential Diagnosis of Chronic Perforating Carcinoma of the Colon. CLYDE A. STEVENSON and ARNO W. SOMMER..... 202

Liver, Gallbladder, Pancreas, and Spleen

Bilitinction. L. SCHALM..... 150
Fibrosis of the Sphincter of ODDI. RICHARD B. CATTELL and BENTLEY P. COLCOCK..... 151
Radiomanometric Examination of the Biliary Ducts: Experience with 418 Cases. GUY ALBOT, CLAUDE OLIVER, and HENRY LIBAUDE..... 151
Secondary Operations on the Biliary Tract. C. P. SCHLICKE..... 152
Pancreatic Cysts—Surgical Treatment Especially by the Use of Internal Drainage: With a Report of 6 Cases. ALEXANDER L. ZAOUSSIS..... 152
Operative Technique of Resection of the Head of the Pancreas. RUDOLF FELKEL..... 152
Pancreaticoduodenal Cancer. WILLIAM V. MCDERMOTT, JR., and MARSHALL K. BARTLETT..... 153
Splenic Cysts with Report of a Case of a Large Unilocular Cyst of Rapid Growth. RICHARD P. BELL, JR..... 154
Visualization of the Common Duct During Cholecystography. Its Significance. MAURICE D. SACHS. 202

Miscellaneous

Right Upper Quadrant Pain in Salpingitis and Other Abdominal Diseases Explained by Absorption of Exudates from the Peritoneal Cavity Through the Diaphragm. POVL HOLM-NIELSEN..... 157

GYNECOLOGY

Uterus

Carcinoma of the Cervix—An Experience with Surgical Treatment. JOE VINCENT MEIGS..... 155
Postirradiative Prophylactic Extraperitoneal Lymphadenectomy in Carcinoma of the Uterine Cervix. GUNNAR GORTON..... 155
Avoidance of Injuries of the Intestines During Intravaginal Irradiation of Carcinoma of the Cervix. W. HEYDE and H. J. SCHMERMUND..... 156
Endometrial Cancer and Feminizing Tumors of the Ovaries. Significance of Their Coexistence. LUDWIG A. EMGE..... 157

Adnexal and Periuterine Conditions

Right Upper Quadrant Pain in Salpingitis and Other Abdominal Diseases Explained by Absorption of Exudates from the Peritoneal Cavity Through the Diaphragm. POVL HOLM-NIELSEN..... 157

Polyethylene Intubated Salpingoplasty. MARIO A. CASTALLO and AMOS S. WAINER..... 157

Miscellaneous

Experimental Studies on the Bisexual Hormonal Activities of Cholesterin, Testosterone Propionate, Androstendiol Dipropionate, and Dehydroandrosterone. F. DESTRO..... 158

Bacteroides Infections in Obstetrics and Gynecology. BAYARD CARTER, CLAUDIUS P. JONES, ROBERT L. ALTER, ROBERT N. CREADICK, and WALTER L. THOMAS..... 158

Endometriosis of the Pelvis. Clinical Contribution to the Histopathogenetic Theory of Sampson. GIOVANNI GARRONE..... 158

Endometriosis: Etiologic Role of Marriage, Age, and Parity; Conservative Treatment. JOE VINCENT MEIGS..... 159

Suburethral Fibromas in Women. P. FUNCK-BRENTANO, H. ROBERT, and BALZA GUILLERMO..... 159

OBSTETRICS

Pregnancy and Its Complications

Pelvic Deformities of Grade 1, at the Obstetrical Clinic of Bologna, Italy (1937–1951). CORRADO BELVEDERI and LUIGI BARTOLOTTI..... 160

Anticoagulant Therapy in the Toxemias of Pregnancy. Clinical and Experimental Contribution. ITALO PANELLA..... 160

Attempts at Enzymatic Therapy (Hyaluronidase) of the Toxicoses of Pregnancy. C. PELLIZZARI.... 161

Extensive Bilateral Nephrolithiasis and Gravidity. H. MEUSER..... 161

Puerperium and Its Complications

Twenty Years of Experience with Manual Removal of the Placenta at the Obstetrical and Gynecological Clinic of "L. Mangiagalli." I. VANDELLI and A. GIACOMELLI..... 161

Miscellaneous

Measurement of the Uterine Blood Flow and Uterine Metabolism. Critical Review of Methods. N. S. ASSALI..... 162

GENITOURINARY SURGERY

Adrenal, Kidney, and Ureter

Diagnosis of Hypertension Caused by Pheochromocytoma, with Remarks on the Use of Regitin for Diagnostic and Intraoperative Purposes. J. M. BAYER and H. ODENTHAL..... 163

An Adrenalin Producing Tumor Outside of the Adrenal Glands. KARIN WIRD-LÖKK and KARL-GUNNAR TILLINGER..... 164

Hydronephrosis in Children. A Clinical Study of 78 Cases with Special Reference to the Role of Aberrant Renal Vessels and the Results of Conservative Operations. H. H. NIXON..... 164

Streptomycin, PAS, and Isoniazid in Renal Tuberculosis. JOHN K. LATTIMER, FRED LERMAN, PHILIP LERMAN, and LOUIS L. SPIVACK..... 165

Complications Following the Use of Streptomycin and Para-Amino-Salicylic Acid in Advanced Renal Tuberculosis. S. SCHER..... 165

Partial Nephrectomy in the Treatment of Renal Tuberculosis. S. PETKOVIĆ..... 165

Partial Nephrectomy in Renal Tuberculosis. EINAR LJUNGGREN and OLA OBRANT..... 165

Kidney Homotransplantation. W. J. DEMPSTER..... 166

Some Observations upon Absorption after Ureterosigmoidostomy. C. D. CREEVY..... 166

Bladder, Urethra, and Penis

Histological Studies on the Local Action of Roentgen Therapy in a Case of Vesical Tumor. G. PICCOLO and G. LONGO..... 166

Reconstruction of the Perineal Urethra with a Free Full-Thickness Skin Graft from the Prepuce. DAVID PRESMAN and DUANE L. GREENFIELD... 166

Utilization of the Scrotum in the Reconstruction of the Penis. BUFORD S. CHAPPELL..... 167

Genital Organs

What Makes the Prostate Grow? WILLIAM WALLACE SCOTT..... 167

The Adiuretin Test, a Rapid Renal Function Test in Hypertrophy of the Prostate. H. DETTMAR and W. BRENNER..... 168

Clinical and Histologic Considerations with Reference to the Subject of Carcinosarcoma of the Prostate. LUCIANO DELZOTTO and SERGIO GODENA..... 169

The Response of Prostatic Carcinoma to Estrogen Treatment. J. D. FERGUSSON and L. M. FRANKS 169

Developments in Surgery of the Prostate Gland. G. BIEDERMANN..... 170

Considerations with Reference to the Transvesical Prostatectomy of Harris-Hryntschak. MICHELANGELO SORRENTINO..... 170

Miscellaneous

The Subject of Allergy in the Practice of Urology. H. HEUSSER..... 171

Postoperative Osteitis Pubis. O. FROEHLICH and L. FARKAS..... 171

Erythroplasia of Queyrat. JAMES W. MERRICKS and THOMAS L. C. COTTRELL..... 172

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

Conditions of the Bones, Joints, Muscles, Tendons, Etc.

Correction of Scoliosis by Spreading of the Ribs. WILLI FELIX..... 143

Biophysical and Physiological Investigations on Cartilage and Other Mesenchymal Tissues. Characteristics of Human Nuclei Pulposi During Aging. CARL HIRSCH, STEN PAULSON, BENGT SYLVÉN, and OLLE SNELLMAN..... 173

Studies on Structural Changes in the Lumbar Annulus Fibrosus. CARL HIRSCH and FRITZ SCHAJOWICZ..... 173

Radiographic Consideration of the Medial Paracondylar Femoral Calcification. SERGIO CHIAPPA. 174

Principles of Vertebral Tomography. INGEMAR BOKSTRÖM..... 203

A Case of Neurofibromatosis of Recklinghausen with Osseous Changes on the Tibia. INGEMAR BOKSTRÖM..... 207

Surgery of the Bones, Joints, Muscles, Tendons, Etc.

Functional Results in Arthroplasty of the Hip Joint. R. MERLE D'AUBIGNÉ..... 174

Fusion of the Sacroiliac Junction. ANDRÉ SICARD and ALBERT MOULONGUET..... 175

Tendon Transplantations in Median-Nerve and Ulnar Nerve Paralysis. DANIEL C. RIORDAN..... 176

Fractures and Dislocations

The Treatment of Traumatic Paraplegia in Fractures of the Lumbodorsal Spine. IAN LAWSON DICK. 133

Open Reduction and Osteosynthesis of the So-Called Bennett's Fracture in the Carpometacarpal Joint of the Thumb. K. O. GEDDA and E. MOBERG. 176

The Results in Fracture of the Wrist. R. SOEUR.... 177

Fracture of the Anterosuperior Iliac Spine. G. BRUNELLI..... 177

The Treatment of Acute Fractures of the Femoral Neck by Means of Acrylic Prosthesis. ANDRÉ SICARD, LUCIEN LEGER, and ANDRÉ BRUEL.... 178

Treatment of Recent and Old Fractures of the Astragalus. S. BRANCIFORTI..... 178

Orthopedics in General

The Pathology, Symptoms and Therapy of Sudeck's Disease. HANS MOSER..... 179

The Need for Basic Investigation in Orthopedic Surgery. FRANCIS M. MCKEEVER..... 180

An Autographic Study of Bone Section in Vitro with Radiocalcium. RODOLFO AMPRINO..... 180

Experimental Study of the Fate of Bone Grafts. CRAWFORD J. CAMPBELL, THOMAS BROWER, D. GLEN MACFADDEN, EDWARD B. PAYNE, and JAMES DOHERTY..... 180

The Calcium and Phosphorus Metabolism in Normal and Disturbed Healing of Fractures as Well as Fresh and Bone Bank Bone Graft. HERMANN KARCHER..... 181

Experimental Studies on Bone Grafts Conserved by Refrigeration. ANDRÉ SICARD and ROGER MOULY..... 181

Tenth Anniversary Number in Honor of Victor Putti. C. E. OTTOLENGHI, A. BONOLA, S. COLOMBANI, F. DELITALA, and Others..... 182

Problems of Postoperative Position and Motion in Surgery of the Hand. JULIAN M. BRUNER..... 183

The Late Results of Volkmann's Contracture. A. TRILLAT and G. COQUET..... 183

Controlled Paralysis of Skeletal Muscle. A. L. WNUCK, STATA NORTON, C. H. ELLIS, and E. J. BEER..... 194

SURGERY OF BLOOD AND LYMPH SYSTEMS

Blood Vessels

Management of Intracranial Arterial Aneurysms. HOMER D. KIRGIS and DEAN H. ECHOLS..... 131

Transposition of the Great Vessels. JOHN D. KEITH, C. A. NEILL, PETER VLAD, R. D. ROWE, and A. L. CHUTE..... 141

Vascular Injuries. PAULO SAMUEL SANTOS..... 184

Traumatic Pseudoaneurysm of the Subclavian Vessels Successfully Operated Upon. A. M. DOGLIOTTI..... 184

Thromboembolic Phenomenon; A Local Process with Regional Spread and Systemic Complications. MIMS GAGE..... 184

Aortic and Iliac Pathology as Seen by Means of Aortography. GIOVANNI MARCOZZI..... 185

Progressive Constructive Occlusion of the Aorta with Wiring and Electrothermic Coagulation for the Treatment of Arteriosclerotic Aneurysms of the Abdominal Aorta. ARTHUR H. BLAKEMORE.... 185

Successful Resection of Aneurysm of Thoracic Aorta and Replacement by Graft. MICHAEL E. DE BAKEY and DENTON A. COOLEY..... 186

Some Effects of Cortisone on Aortic Grafts. J. R. BARBERIO, JAMES W. PATE, PHILIP N. SAWYER, and C. A. HUFNAGEL..... 187

Discussion of the Pathogenesis and Surgical Treatment of Bifurcation of the Aorta. P. VAN DER LINDEN..... 187

Leriche's Syndrome. Resection of Bifurcation of the Aorta. Results After 2½ Years. JEAN CAHEN 187

Fluorescein After Exercise: A Method of Investigation in Peripheral Arterial Diseases. B. EJRUP..... 188

Primary Repair of Major Arterial Injuries. EDWARD J. JAHNKE, JR., and JOHN M. HOWARD..... 188

Experimental Contributions to the Study of Methods of Surgical Treatment of Arterial Occlusion. MARCEL VAN DER GHINST..... 188

The Treatment of Venous Thrombosis with Heparin. CURTIS P. ARTZ and EDWIN J. PULASKI..... 189

The Clinical Manifestations and Therapy of the Paget-Schroetter Syndrome. A. BALÁS, J. STEFANICS, L. RANKY, and P. GÖRGÖ..... 189

Microangiography. SVEN BELLMAN..... 203

Reticuloendothelial System

Freeze-Dried Aortic Grafts. A Preliminary Report of Experimental Evaluation. JAMES W. PATE and PHILIP N. SAWYER..... 190

SURGICAL TECHNIQUE

Operative Surgery and Technique; Postoperative Treatment

Protein Metabolism of Surgical Patients. F. E. REVERS and C. EIKELENBOOM..... 191

Cardiac Arrest and Ventricular Fibrillation. B. D. STEWART, ROBERT W. VIRTUE, and HENRY SWAN 192
Cardiac Arrest in Infants and Children. WILLIAM H. SNYDER, JR., MONICA H. SNYDER, and LAWRENCE CHAFFIN 192

Antiseptic Surgery; Treatment of Wounds and Infections

An Assessment of the Therapy of Burns: A Clinical Study. CARL A. MOYER 192
The Use of Dextran (Macrodex) in Burns. Review of the Physiology of Dextran. EDWARD V. JOHNSTON and JOHN S. LUNDY 192
Use of Dextran (Macrodex) in Burns. Clinical Evaluation in 8 Cases. EDWARD V. JOHNSTON, WARREN A. BENNETT, JOHN S. LUNDY, and JOSEPH M. JAMES 193
Streptokinase and Streptodornase in the Treatment of Hemothorax and Pyothorax, and Acute and Chronic Suppuration in Other Sites. GIUSEPPE D'ASTE and GIO-BATTA CERRUTI 193

Anesthesia

Controlled Paralysis of Skeletal Muscle. A. L. WNUCK, STATA NORTON, C. H. ELLIS, and E. J. BEER 194
Xylocaine: A Superior Agent for Conduction Anesthesia. JAMES L. SOUTHWORTH and C. HARWELL DABBS 194
Management of Anesthesia of the Severely Burned Patient. JOHN R. ROOK 194
The Problem of the Anesthetic in the Surgical Therapy of Myasthenia Gravis. ANTONIO DAURI 194

Surgical Instruments and Apparatus

The Conservative Treatment of Hemangiomatous Nevi. H. J. WALLACE 195
Plantar Keratodermia Treated by Split-Skin Grafts. D. WYNN-WILLIAMS 196
The Treatment of Hemangiomas. D. N. MATTHEWS 197
Surgical Support in Permanent Facial Paralysis. C. R. MCLAUGHLIN 198
Use of Intra-Aortic and Intracardiac Transfusions in Cardiac Arrest. HUGH E. STEPHENSON, JR., and J. WILLIAM HINTON 198
The Bilobed Flap. ALEXANDER ZIMANY 199
The Use of Preserved Bovine Cartilage in Plastic Surgery. JOHN F. NORTH 199

PHYSICOCHEMICAL METHODS IN SURGERY

Roentgenology

Minimal Amount of X-Ray Exposure Causing Lens Opacities in the Human Eye. DAVID G. COGAN and KNUD K. DREISLER 126
Radiomanometric Examination of the Biliary Ducts: Experience with 418 Cases. GUY ALBOT, CLAUDE OLIVER, and HENRY LIBAUDE 151
Postirradiative Prophylactic Extraperitoneal Lymphadenectomy in Carcinoma of the Uterine Cervix. GUNNAR GORTON 155
Avoidance of Injuries of the Intestines During Intravaginal Irradiation of Carcinoma of the Cervix. W. HEYDE and H. J. SCHMERMUND 156
Histological Studies on the Local Action of Roentgen Therapy in a Case of Vesical Tumor. G. PICCOLO and G. LONGO 166
Radiographic Consideration of the Medial Paracondylar Femoral Calcification. SERGIO CHIAPPA. 174
An Autographic Study of Bone Section in Vitro with Radiocalcium. RODOLFO AMPRINO 180
Aortic and Iliac Pathology as Seen by Means of Aortography. GIOVANNI MARCOZZI 185
Diagnostic Radiological Aspects of Hypopharyngeal Cancer. SOLVE WELIN 200
The Value of Tomography in Examination of the Intrapulmonary Bronchi. HERMAN LODIN 200
Further Studies on the Early Diagnosis of Cancer of the Stomach. GIOVANNI SANQUIRICO and NICOLO MINUTO 201
The Roentgen Diagnosis of Bleeding Lesions of the Small Intestine. ANDREW P. DEDICK and LOIS COWAN COLLINS 201
Duodenal Stenosis Resulting from Arterial Compression. FRANCO FUGAZZOLA 201
Differential Diagnosis of Chronic Perforating Carcinoma of the Colon. CLYDE A. STEVENSON and ARNO W. SOMMER 202
Visualization of the Common Duct During Cholecystography; Its Significance. MAURICE D. SACHS 202
Principles of Vertebral Tomography. INGEMAR BOKSTRÖM 203
Microangiography. SVEN BELLMAN 203
Radiumhemmet's Method of Treatment in Hypopharyngeal Cancer. SVEN HULTBERG 204
Dissection of the Neck After Intensive Irradiation to the Neck. Its Feasibility in the Management of Cervical Metastasis from Oral Cancer. S. GORDON CASTIGLIANO and C. JULES ROMINGER 205
Radiation Burns from Diffraction Apparatus Simulating Infections. Report of Cases. R. M. WATROUS, HAZEL W. HODGES, and M. J. MCANDREW 206

MISCELLANEOUS

Clinical Entities—General Physiological Conditions

The Shoulder-Arm Syndrome. ANTHONY F. DEPALMA. 207
Metastasizing Hemangiomas. A Case of Malignant Hemangioendothelioma. DAVID TIBBS 207
A Case of Neurofibromatosis of Recklinghausen with Osseous Changes on the Tibia. R. KUEBLER 207
Cancer as a Chronic Disease. JOHN J. MORTON, JR., and JOHN H. MORTON 207
Treatment of Fibrosarcoma. EDWARD S. STAFFORD and GRANT E. WARD 207

Experimental Surgery

Homotransplantation of the Dog Heart. H. G. DOWNIE 208
Contributions to the Study of Skin Homografts. L. GALLONE, G. RADICI, and G. RIQUIER 208

INTERNATIONAL ABSTRACTS OF SURGERY

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COLLECTIVE REVIEW

THE TREATMENT OF PERFORATED PEPTIC ULCER BY PRIMARY GASTRIC RESECTION

HORACE G. MOORE, Jr., M.D., Wilmington, North Carolina, HENRY N. HARKINS, M.D., F.A.C.S., and K. ALVIN MERENDINO, M.D., F.A.C.S., Seattle, Washington

SEVERAL divergent viewpoints pervade the surgical literature concerning the proper management of the patient with acute acid peptic gastroduodenal perforation. This suggests that one or both of the following hypotheses are true: (1) that none of the methods of treatment is entirely satisfactory, and (2) that there has been partial failure on the part of the surgeon to individualize the patient with respect to the treatment administered and to individualize himself with respect to his ability to administer that treatment.

Regarding the first hypothesis, it is axiomatic to say that a totally satisfactory therapeutic technique must cure the disease for which the treatment is given and at the same time the treatment must not impose new hazards and disabilities upon the patient.

The problem of treatment of perforated ulcer involves not only the acute life-threatening episode, but also the subsequent dangers of further trouble with the ulcer. When confronted with a patient with perforated ulcer, the surgeon must search his own experience and the experiences of others with this complicated problem to find the answer to the all-important question: Shall I attempt to treat the acute episode and the underlying disease process concomitantly or in sequence *in this particular patient?* Regardless of his answer, he must accept the responsibility to see that both these aspects *are* treated.

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The rationale of individualization of treatment is apparent when one considers that some patients with acute perforations who are treated by simple closure, or even by nonoperative gastric suction, will have no further ulcer difficulty. Others so treated will continue to have varying degrees of disability not uncommonly culminating in another life-threatening acute episode. The general condition of the patient may range from excellent to moribund at the time he seeks the aid of a surgeon. The patient's general condition partially dictates the limitations, in terms of immediate mortality and morbidity, of his ability to withstand either a simple closure or an immediate gastric resection. These are the two most commonly accepted methods of operative treatment of perforated peptic ulcer. The method of simple closure is, of course, directed solely to the treatment of the acute episode and is the standard method used in most American clinics. It must always be followed by the treatment best designed to control the particular patient's underlying ulcer disease. Simple closure per se usually does not contribute any new disability to the patient. Immediate subtotal gastric resection treats not only the acute episode but also the primary underlying disease process. That subtotal gastric resection is efficacious in controlling the ulcer diathesis has been shown by Wangensteen *et al.* (1940, 1942). The recurrence rate of Wangensteen's (1952) cases following a three-quarter gastric resection was only 1.1 per cent. In spite of the excellence of this insurance against recurrent ulceration, those of us who have closely

followed patients with a residual of only 25 per cent of the stomach are acutely aware of the occasional high cost of this insurance. This cost is in the form of dumping and other postgastrectomy syndromes, and metabolic and nutritional disturbances. One may expect that approximately 10 per cent of the patients with subtotal gastrectomy will suffer some disability of this sort and even more will have nondisabling but unpleasant symptoms due to the resection (Wangensteen, 1952; Moore, *et al.*, 1952, 1952, and 1953).

In view of these considerations, it would then seem irrational to approach the problem of perforated ulcer therapy with a fixed rule of thumb without due regard to each individual patient's needs and the judicial and technical ability of the individual surgeon to supply such needs. If some patients with perforated ulcer, simply closed, would have no further major ulcer difficulty, then why should we burden them with the 10 per cent chance of having disabling postgastrectomy syndromes? On the other hand, if some others with perforations would develop disability, even to the point of further life-threatening complications, then should we not perform immediate subtotal gastrectomy at the time of perforation and obviate the necessity of a second operation? Immediate gastrectomy for perforation must carry with it an acceptable mortality and morbidity or its use could not be advocated except when, for technical considerations, simple closure is not feasible, e.g., a massive defect which cannot be closed or a completely obstructed pylorus.

Our small series of 13 cases of immediate gastrectomy for ulcer perforation is analyzed for the purpose of studying the immediate success and acceptability of this procedure in our hands. The late results of immediate gastrectomy may reasonably be expected to coincide with the late results of nonemergency gastrectomy.

ANALYSIS OF CASES

The 13 cases in this study include all of the patients with perforated peptic ulcer who were treated by primary gastric resection at the King County Hospital, Seattle. All of these patients were operated upon between May 24, 1950 and September 5, 1952, inclusive. (n.b.: From September 6, 1952 to date [December 8, 1953] 9 additional immediate gastric resections for perforated peptic ulcer have been done on our service—a total of 22 cases). These additional cases are not included in the analysis which follows. The last patient in this additional group, J.A., male, aged 68, died on October 21, 1953, the eleventh day after a resection for acute perforated anterior duodenal ulcer. At necropsy a leak at the site of anastomosis was found with generalized peritonitis. Additional features include the following: the patient had severe arteriosclerosis for which progressive amputations were performed involving one leg and ending in midthigh amputation in October, 1952. At exploratory laparotomy multiple fibrous adhesions were found, indicating a possible previous perforation. The fresh perforation was bound to the under surface of the liver by fibrinous adhesions which were easily separated. The exposed perforation was found to involve approximately 60 per cent of the circumference of the duodenum. The original intention of the surgeon was to do a simple closure, but a resection was done because of the size of the ulcer. In the group of 22 cases, this death gives a mortality rate of 4.5%. During the period under analysis 29 patients were treated by simple closure with 1 death and 14 were treated by nonsurgical means with 10 deaths. Of the 14 treated by nonsurgical means, 4 were classified as moribund on admission, and all of these died.

Our criteria for the selection of cases for primary resection have been based on the following considerations: length of time between perforation and surgery (usually under 8 hours), the general condition of the patient, and the previous experience and inclination of the operating surgeon. Seven of our patients were operated upon by members of the resident staff and 6 by the attending staff.

The average age of our 13 patients was 48.6 years, with a range between 22 and 75 years. The series included 11 males and 2 females; there were 11 Caucasians, 1 American negro, and 1 Chinese.

Preoperative analysis. The pertinent preoperative data for each patient are tabulated in Table I. Six of the patients gave histories of ulcer difficulty for the preceding 3 or more years. The other 7 had had ulcer symptoms for less than 2 years, including 4 patients with ulcer histories of less than 2 months. Two patients had had minor ulcer bleeding and 2 had had occasional mild obstructive symptoms. One patient had had a previous minimal Billroth II type of resection and the present resection was for his second stomal ulcer perforation. Two other patients had each had one previous perforation of a duodenal ulcer. Five of the 13 patients were chronic alcoholics.

All but 1 of the patients were operated upon within 8 hours of the time of perforation. The exception was not diagnosed as having a perfo-

TABLE I.—PREOPERATIVE DATA FOR EACH PATIENT

Case	Sex	Age	Previous ulcer difficulty	Concomitant condition	Time, perforation to surgery (hrs.)	White blood cell count	Free air by x-ray		Abdominal rigidity	Shoulder pain	Bowel tones	Time of day perforation occurred
							Erect	Left lateral decubitus				
G.B.	Male	29	Pain for 2 wks. on 2 occasions in previous yr.	None	6	21,000	—	Yes	Yes	Yes	None	4 P.M.
J.B.	Male	60	Pain for 20 yrs.	None	7½	8,600	Yes	—	Yes	—	None	2:30 P.M.
O.G.	Male	48	Pain for 16 yrs., mild bleeding, slight obstruction	Obesity	5½	19,600	Yes	—	Yes	Yes	Slight	6 P.M.
J.G.	Male	22	Pain for 5 days	None	5¼	18,400	None	None	Yes	Yes	None	1 P.M.
C.P.	Male	47	Pain for 9 yrs.	Chronic alcoholism	3	10,300	Yes	Yes	Yes	Yes	None	12:45 P.M.
W.G.	Male	36	Pain for 2 yrs., 1 previous perforation, moderate obstruction	None	4½	17,600	—	None	Yes	None	None	9:30 P.M.
G.H.	Male	75	Pain for 1 mo.	None	8	5,400	—	Yes	Yes	Yes	None	12 M.
H.S.	Male	51	Pain for 2 yrs. mild bleeding	None	7½	—	Yes	Yes	Yes	—	None	4 P.M.
F.R.	Male	75	Partial resection 9 yrs. ago, perforation stomal ulcer 2 yrs. ago (Billroth II)	None	72 Unrecognized until surgery	10,700	Yes	—	None	—	Increased	—
D.R.	Female	44	Diarrhea for 3 yrs.	Chronic alcoholism	3¼	15,300	—	Yes	Yes	None	None	11:45 A.M.
M.D.	Male	63	Previous perforation 10 yrs. ago	Chronic alcoholism and schizophrenia	7	12,200	Yes	None	Yes	Yes	None	11:30 P.M.
L.D.	Male	44	Pain for 3 days	Chronic alcoholism	5	10,100	Yes	Yes	Yes	Yes	None	10:30 A.M.
T.G.	Female	38	Pain for 2 mos.	Chronic alcoholism	6¾	8,000	—	Yes	Yes	Yes	None	10 P.M.
Average		48.6				13,100						

ration until the time of surgery. In retrospect it was thought that his ulcer had probably perforated 72 hours previously.

Most of our patients showed leucocytosis, the average white count for the 12 patients with recorded values being 13,100 white blood cells per cubic millimeter.

Abdominal roentgenograms to demonstrate free peritoneal air were obtained in each case but free air was found in only 11 cases. Erect films were made in 8 cases with the demonstration of free air in 7 of these. Left lateral decubitus films were taken of 10 patients, and free air was visible on 7 of these. In 1 instance pneumoperitoneum was demonstrated on the erect film but not on the left lateral decubitus film.

All but 1 of the patients showed typical abdominal rigidity and tenderness. Definite information concerning associated shoulder pain was recorded for 10 patients; 8 of these gave a history of such pain radiation. One of the patients who did not have such pain had had a previous perforation, at which time he did have shoulder pain. Bowel tones were absent or diminished in all but 1 case.

The distribution as to the time of day of perforation is of interest. Six of the patients developed perforation in the afternoon, 4 at night, and 2 in the morning. The time in one instance was not certain.

Operative analysis. Table II lists the important details of the operative procedure. The perforation was located on the anterior or superior surface of the duodenum in all of the patients except in the one who had had a previous Billroth II type of resection; in this case the perforation was in the jejunum 8 centimeters distal to the gastrojejunostomy. In 1 patient (D.R.) the perforated ulcer involved two-thirds of the duodenal circumference. The perforation was not

TABLE II.—OPERATIVE DATA FOR EACH PATIENT

Case	Ulcer location	Peritoneal reaction	Peritoneal culture	Type of anastomosis	Surgeon's estimate of extent of resection (Per cent)	Drainage
G.B.	Anterior duodenum	Slight	Sterile	Billroth I	80	None
J.B.	Anterior duodenum (also posterior)	Slight	Staphylococcus albus (? contaminant)	Billroth II	75–80	None
O.G.	Anterior duodenum	Slight	—	Billroth II	75	One Penrose drain
J.G.	Anterior duodenum	Slight	—	Billroth I	75	None
C.P.	Anterior duodenum	Slight	Sterile	Billroth I	75	None
W.G.	Anterior duodenum	Slight	—	Billroth I	75	One Penrose drain
G.H.	Anterior duodenum	Slight	Sterile	Billroth I	75	None
H.S.	Superior duodenum	Slight	Sterile	Billroth I	75	None
F.R.	Marginal of jejunum	Moderate	—	Billroth I	—	None
D.R.	⅔ Circumference of duodenum	Moderate	—	Billroth II	67	T-tube of common duct and one Chaffin tube
M.D.	Anterior duodenum (also posterior)	Slight	—	Billroth I	67	Two Chaffin tubes
L.D.	Superior duodenum	Slight	—	Billroth II	80–85	One Chaffin tube
T.G.	Anterior duodenum	Moderate	—	Billroth I	76	One Chaffin tube

sealed in any instance. Two patients had active posterior penetrating ulcers (neither with bleeding) in addition to the anterior perforated ulcer.

The amount of peritoneal reaction was considered slight to moderate in all of the cases. There was no frank purulent reaction in any case. The peritoneal fluid of 5 patients was cultured and found to be sterile in 4. The positive culture showed only a few colonies of Staphylococcus albus, which might have been a contaminant.

A Billroth I anastomosis was performed on 9 patients, including the patient who had had a previous minimal Billroth II type of resection. The 4 other resections were achieved with gastrojejunal anastomoses.

As seen in Table II, the surgeon's estimate of the extent of the resection in all of the cases (except case F.R., which was a re-resection) ranged from two-thirds to four-fifths of the stomach. The average weight of the resected stomach specimens in the 11 cases in which we have such measurements was 214 grams. The average curvature measurements of the resected specimen in 12 cases for the lesser curvature was 15 centimeters and for the greater curvature 25 centimeters. The authors (1952) have previously shown, by correlating the specimen weight and curvature measurements with the actual area resected, that for duodenal ulcer a weight of 223 grams and curvature lengths of 14 and 25 centimeters, respectively, represent an average three-fourths gastric resection.

Drainage was not employed in 7 cases. A Penrose drain was used in 2 cases and a Chaffin sump drainage suction tube in 4 instances. Also, in one of the latter instances (case D. R.) a T-tube was placed in the common bile duct early in the operation for identification purposes to avoid injury to this structure, and it was left in for a few days postoperatively.

Postoperative analysis. Pertinent features of the postoperative course for each patient are shown in Table III. All patients were given some combination of antibiotics for the first postoperative week. Ten patients received both penicillin (300,000 units per day) and streptomycin (1 gram per day). One patient received only penicillin (300,000 units per day). Another was given intravenous aureomycin (1 gram per day for 2 days) in addition to the penicillin and streptomycin. One patient received terramycin (1 gram per day for 3 days) and penicillin (300,000 units per day for 9 days).

Eight patients had no significant postoperative fever. One patient (H.S.) had a fever spike to 102° (rectal) on the third day without any known cause. Three other patients with significant temperature elevations were found to have patchy atelectasis. There was 1 patient (D.R.) who developed a moderately severe electrolyte imbalance in the early postoperative period, but this was corrected with meticulous management.

Serious immediate difficulty was encountered in only 1 case (T.G.). This patient developed a

wound disruption and the indwelling Wangensteen tube perforated the residual gastric pouch on the fifth postoperative day. Surgical repair was achieved at that time. The following day her serum protein was determined for the first time and was found to be only 3.88 grams per 100 cubic centimeters. She developed aspiration pneumonia necessitating a tracheotomy. The patient was given supportive therapy in the form of blood transfusions, glucose, amino acids, and the intravenous administration of alcohol. Four days later her wound again disrupted and the gastric fistula re-established itself. Again closure of the fistula was achieved, but in 2 days it was discharging freely into the wound again. For feeding purposes a Cantor tube was inserted through the fistula into the jejunum. Under this feeding regime her total serum protein rose to normal levels, but her albumin fraction was still low. One month after insertion of the Cantor tube, she developed a jejunal obstruction due to a combination of adhesions and inflation of the Cantor tube balloon with diffused gas. (This aspect of the case is the subject of a separate report—Moore, Fletcher, *et al.*, 1953.) This patient was again taken to surgery for the relief of her obstruction, and later for closure of the fistulas. At the present writing these have remained closed for a period of 8 months and the patient is feeling well.

There was no instance of known suture line leak causing a wound or intraperitoneal abscess formation in this series. The only exception to this was the wound disruption and intraperitoneal abscess formation due to the gastric fistula described (case T.G.).

The average hospital stay due to the ulcer operation was 10.7 days after the operation for all patients except T.G. who remained in the hospital 8 months. This figure of 10.7 days compares favorably with the average hospital stay in our series of elective Billroth I gastric resections, which was 11 days (Moore and Harkins, 1952).

Follow-up studies. There were no hospital deaths in this series. The patient (T.G.) who remained in the hospital eight months was a female, and the other patient in this series who did poorly (D.R.) was also a female. The remainder of the patients were males. D.R. was a chronic alcoholic, whose perforation involved at least two-thirds of the duodenal circumference. Since it was impossible to close this perforation, it was necessary to perform an immediate resection. Two and one-half months later she was readmitted with a gastrojejunocolic fistula. Another extensive gastric resection and a transabdominal vagotomy were performed which left only a tiny residual gastric pouch. She did poorly after this last procedure and, although advised to return sooner for a postoperative checkup, did not appear until 46 days later when she was in a moribund condition, weighing only 52 pounds. Autopsy showed that she died of a perforated gastrojejunoesophageal ulcer with abscess. It is doubtful that any therapy short of total gastrectomy would have relieved her ulcer diathesis.

We have no follow-up studies on 1 patient (G.B.). Two patients (not including D.R.) have been followed up for 2½ months and 3½ months, respectively, with no major complaints, 1 patient having mild dumping. There are 9 other patients (including T.G.) who have been followed up between 7 and 22 months, with no difficulty attributable to peptic ulcer. One of these patients has occasional mild dumping associated with overeating.

HISTORICAL DATA

No attempt is made here to achieve an exhaustive review of the literature on this vast subject; however, it is believed that sufficient numbers of representative statistics and viewpoints have been collected to enable us to gain certain unprejudiced impressions. The collected literature on the subject seems to lend itself well to the categorization which we follow.

Mikulicz (1897) probably did the first operation for perforated peptic ulcer in the form of a simple closure in 1880. His patient died 3 hours later in shock.

Keetley of London, England (1902) reported that on December 15, 1899 he operated upon a patient with an acute abdominal condition and found a "spontaneous rupture of the stomach" at a scarred and indurated pylorus. He was fearful that the induration might represent a malignancy; therefore he resected the indurated area including the lower portion of the stomach. He closed a portion of the stomach and anastomosed the remainder to the end of the duodenum. The patient did well. This probably represents the first recorded immediate partial gastric resection for perforated ulcer and it is of interest that it was performed *ad modum* Billroth I.

The literature that has been collected has been grouped into four main headings: (1) experiences of others with immediate definitive versus nondefinitive treatment of perforated peptic ulcer, (2) nonoperative gastric aspiration, (3) peritoneal culture following perforation, and (4) influence of sex on prognosis.

TABLE III.—POSTOPERATIVE DATA FOR EACH PATIENT

Case	Antibiotics	Postoperative fever (rectal) (highest spike)	Postoperative complications	Hospital days due to resection
G.B.	Penicillin and streptomycin	103.4° on third day	Atelectasis	8
J.B.	Penicillin and streptomycin	103° on fifth day	Atelectasis	8
O.G.	Penicillin and streptomycin	105° on first day	Atelectasis	8
J.G.	Penicillin and streptomycin	101° on first day	None	8
C.P.	Penicillin and streptomycin	100.2° on first day	None	7
W.G.	Penicillin and streptomycin	101.2° on fourth day	None	11
G.H.	Aureomycin, penicillin, and streptomycin	101.8° on second day	None	9
H.S.	Terramycin and penicillin	102° on third day	None	10
F.R.	Penicillin and streptomycin	100.8° on second day	None	14
D.R.	Penicillin and streptomycin	101° on second day	Electrolyte imbalance	23
M.D.	Penicillin	100.8° on second day	None	10
L.D.	Penicillin and streptomycin	99.8° on first day	None	12
T.G.	Penicillin and streptomycin	Continuous fever due to complications	Gastric fistula and wound disruption	Remained in hospital 8 months postoperatively

Experiences of others with immediate definitive versus nondefinitive treatment of perforated peptic ulcer. The German and Austrian surgeons were the first to express dissatisfaction with simple closure as the treatment of choice of perforated peptic ulcer. Graves (1933) stated: "But simple suture of the perforation did not often cure the almost ever-present gastritis or additional ulcers, so the German surgeons soon began adding a gastroenterostomy." Because of the high incidence of recurrent ulcer following gastrojejunostomy, these surgeons, by and large, adopted primary partial gastrectomy (usually Billroth II) as the treatment of peptic perforations. Graves (1933) gave seven reasons for this change in policy: (1) ulcers were multiple in 30 per cent of the patients with acute perforation, (2) gastritis was almost always present, (3) there was difficulty in evaluating the exact condition at the operating table, (4) the German and Austrian surgeons were extremely rapid, usually taking only about 1 hour for the resection, (5) their mortality for good risk patients was less than 5 per cent, (6) the resection in the presence of acute perforation was usually easier than in the elective resection, and (7) there was a high rate of recurrence after the simpler procedures.

Von Haberer (1919) was the first to advocate the general use of immediate subtotal gastric resection for acute peptic perforations, and he (1921) was one of the first to collect a large personal series.

Odelberg (1927), in discussing the early primary resections by the German and Austrian surgeons, made it clear that their choice of cases was not indiscriminate: "The importance of judging every case on its own merits is, however, generally emphasized." Lewisohn (1925) concluded, after reviewing 33 cases of perforated ulcer treated by simple closure (with or without gastroenterostomy), that in 39 per cent there was failure to achieve relief of symptoms. In his experience multiple ulcers occurred in about 50 per cent of the cases. He raised the question of the advisability of adopting "a more radical procedure" for these cases. Odelberg (1927) expressed the probably acceptable assumption that ". . . the end-results of resection in perforated ulcers are about the same as those obtained in nonperforated ulcers." He believed that the patients in his series of 20 cases had smoother and shorter postoperative courses than did patients subjected to an elective resection or simple closure of a perforation.

Gatewood (1930) felt that there was little basis for the contention that closure of a perforation would lead to cure of the patient. Five of 16 patients surviving simple closure developed recurrence, and 1 of 8 surviving closure and gastroenterostomy had a recurrence. These 6 patients with recurrence had subsequent gastric surgery.

Gilmour and Saint (1932) reported 63 cases of perforated ulcer treated by simple suture. Forty-four of these patients had follow-ups, and it was found that 61.4 per cent had further ulcer difficulty and 36.4 per cent had to have secondary gastric surgery. Rousselin (1933) reported that

15 of 30 patients with nondefinitive immediate therapy continued to have ulcer symptoms.

On the other hand, Guthrie and Sharer (1936) were favorably impressed with the permanence of cure following simple closure of perforated duodenal ulcers. Less than 20 per cent of their survivors required delayed gastrojejunostomy for obstruction. Over 95 per cent of the rest who survived simple closure remained well. (There was a 20 per cent mortality rate for simple closure in their series.)

Twenty-nine of 45 patients (64.4 per cent) in Sallick's (1936) series treated by simple closure had further ulcer difficulty.

Judine (1931, 1937, 1939) has probably reported the largest personal series of primary gastrectomies for perforated peptic ulcer. He had used this method since 1928 on all early cases of perforation in young patients. He pointed out that since the perforated ulcer is usually on the anterior or superior aspect of the duodenum, resection is generally technically easy. Moreover, the vast majority of his operations have been performed according to the Billroth I technique. In 1931 he reported the results in 114 patients with perforated peptic ulcer who were operated on during the previous 14 months. Sixteen were treated by simple suture with 7 deaths. Ninety-eight were treated by primary resection with 11 deaths (11.2% mortality). Of the 98 resections, 14 were *ad modum* Billroth II and 84 *ad modum* Billroth I, the Billroth I group having a 10.7 per cent mortality. In 1939, he reported on 937 personal cases of immediate partial gastrectomy for acute perforated ulcer with a mortality of 8.9 per cent. He stated (1937), "Thus it is clear that the radical operation in cases of perforated ulcer not only did not increase the general death rate, but that the death rate declined . . . ."

Lewisohn (1937), on the basis of his experience, thought that a secondary partial gastrectomy should be done if severe ulcer symptoms continue after simple suture.

Shawan (1938) reported on 389 perforated ulcers and preferred simple closure in most instances. Fallis (1938) preferred simple closure, but stated that 36.3 per cent of the patients so treated had persistence or recurrence of the ulcer symptoms. Bunch (1938) advised simple suture of the perforation except when there was pyloric obstruction, although he admitted the vulnerability of the patient to subsequent ulcer trouble.

Ross and Letourneau (1939) found in their study of 228 consecutive cases of perforated ulcer that there was a lower mortality with closure and gastroenterostomy than with closure alone. The average convalescence following the former was 3 to 4 days shorter than after the latter. Trout (1939), on the other hand, utilized simple suture of the perforation in almost all of his cases. Thompson (1939) studied 500 cases of acute perforation and found that within 5 years further ulcer therapy was required in 40 per cent and that 10 per cent required further surgical therapy.

When one of us (H.N.H.) visited Finsterer in Vienna in 1939, this outstanding gastric surgeon made the following statement concerning his opinion regarding the treatment of perforated ulcer: "In acute cases, simple closure. In cases with long history, if gotten within first 6 hours, do resection." Meyer (1940) was of the opinion that simple closure gave the best results with the lowest mortality. Ross (1940) was able to follow up 89 cases in which simple closure was done. Fifty-one patients had no symptoms, but 10 had disabling ulcer symptoms. He recommended simple closure as the treatment of choice.

DeBakey (1940) collected a series of 6,538 cases and found that in 74, or 1.1 per cent, there was reperforation. He found further that in 1,525 collected cases over one-half of the patients remained symptom-free following simple closure and that 16.9 per cent required subsequent operation. DeBakey concluded after his extensive review of the literature that immediate partial gastrectomy had a very limited applicability in the treatment of acute perforation. (Cf. DeBakey's more recent opinion, 1953 [vide infra]).

Milroy (1940) of England expressed the opinion that after a perforation had been closed by suture a secondary resection should be done if any ulcer difficulty arose. In this country, Parker (1941) studied 18 cases of acute perforation treated by simple suture and found that only one-third of the patients remained well. Six of the 18 had to have secondary operations, of which three were for subsequent perforations.

Niess (1941), a German surgeon, reported that in Schmieden's Clinic between 1926 and 1937 there were 111 patients operated upon for acute peptic perforation; 60 of these were treated by gastric resection and 51 by closures with or without gastroenterostomy. In two-thirds of the 111 patients there was present either a second ulcer or gastric inflammation. Niess did not think that the operative results were related in any way to the intensity of the peritonitis. Harrison and Cooper (1942) found that after simple closure of perforated ulcers, recurrent symptoms developed in 82.5 per cent of their cases. They proposed that following recovery from closure of a perforation, the patient should be re-evaluated and

treated as any other ulcer patient. On the other hand, Wakeley (1944), in England, followed up a series of 103 patients with perforated peptic ulcer who were treated at the Royal Naval Hospital and concluded that the late results of simple closure were good enough to justify acceptance of these patients for duty in the Royal Navy.

Mialaret (1944) reported a series of 75 immediate gastrectomies for perforated peptic ulcer. Of this series, 19 represented personal cases and the remaining cases were made available to him for survey by other surgeons in Paris. The mortality in the entire series (operations by 33 surgeons) was 9.3 per cent, which was slightly lower than the mortality rate for simple closure in the same hospitals at the same time. If the 31 patients treated by himself and those of the other two surgeons who were the chief local advocates of the method are considered, the mortality rate was only 3.2 per cent.

Burden (1944), an advocate of closure combined with gastrojejunostomy, stated: "The omission of gastroenterostomy may be justifiable on the grounds of expediency, but imperfect postoperative results are likely to follow in 40 to 60 per cent of the patients. . . . The fault of gastric chemistry is part of the patient's makeup and as such is intractable and persistent. To ignore this tenet in the treatment of perforated duodenal ulcer is to invite recurrence."

In this country, Williams (1944) reported 45 per cent of unsatisfactory late results from the simple closure technique. Three patients of 100 had a second acute perforation, and in 23 there was an indication for further surgery. Williams did not regard acute perforation per se as a sufficient indication for gastric resection.

Reporting from Mt. Sinai Hospital, Cleveland, Strauss (1944) stated that primary gastric resection should replace simple suture of a perforation as the procedure of choice in younger patients in good condition. A somewhat similar view was held by Bisgard (1945) of Omaha, who stressed that it was imperative to do a primary gastric resection for certain conditions, e.g., perforated resectable carcinoma, perforated peptic ulcer associated with hemorrhage, and perforation combined with fixed pyloric obstruction. Bisgard advised the use of primary resection in every good-risk patient with a perforation less than 12 hours old, provided the surgeon is skilled in the techniques of gastric surgery.

In Scotland where perforated ulcers are apparently frequent, Illingworth *et al.* (1946) reported on 733 patients who had not had definitive treatment at the time of perforation. Up to 1 year 40 per cent had ulcer symptoms, and up to 5 years 70 per cent were having difficulty. The incidence of major complications after perforation was 20 per cent in 5 years. Forty (1946) also reported poor results from this method. He found recurrence of symptoms in 38 of 70 patients followed up to 5 years. The patients who had suffered longest prior to perforation showed the highest incidence of recurrence. One-seventh of his patients had secondary operative procedures. In England, Visick (1946), one of the proponents of the conservative (suction) treatment of perforated peptic ulcer, admitted that 50 per cent of his patients so treated showed recurrence of the ulcer symptoms within 5 years.

Haeffner (1947) urged primary resection in all cases of perforated peptic ulcer within 6 hours of perforation if the patient was a good surgical risk. Dressel (1947), on the other hand, after a review of the literature, concluded that simple closure of a perforated ulcer is the method of choice and that, when indicated, elective gastrectomy could be performed later.

The Italian surgeon Bobbio (1948) found that 50 per cent of the patients who have had palliative treatment of perforated peptic ulcer will have persistent ulcer symptoms, and that in the hands of trained surgeons treatment by primary gastrectomy is desirable.

Luer (1950) followed up 102 patients with perforated ulcer treated by nondefinitive methods and found that 78.4 per cent had persistent symptoms. One-third of the total had subsequent hemorrhage and 10.8 per cent developed another perforation. Nineteen of the patients underwent secondary gastrectomies. Ferreira (1950) began his treatment of perforated ulcers with a nonoperative suction regime. If there were not prompt evidence of sealing of the ulcer, he would operate, and if conditions were favorable he would do a primary gastrectomy.

The French surgeon Banzet (1950), at the Hôpital Broussais, reported that he had done 35 primary gastrectomies for perforated ulcer and felt that this treatment was proper for all perforations, except when the patients were moribund.

Mayo and Fitchett (1950) found that after palliative therapy of perforated peptic ulcer patients, only 14.3 per cent remained free of symptoms. Thirty per cent required medical therapy and 16.4 per cent required further surgery. These authors preferred simple closure by and large, but thought primary gastrectomy should be considered in the occasional case with minimal contamination.

Reporting from the Cincinnati General Hospital, Zinninger (1950) stated, "It would seem to be

wise to restrict its [primary resection] use to those cases in which acute perforation is superimposed upon some other complication of ulcer, such as previous perforation, hemorrhage, or obstruction."

Ravdin (1950) preferred simple suture to primary resection although more than 50 per cent of his nonresected patients continued to have serious complaints requiring later resection.

Moore *et al.* (1950) reviewed the cases of perforated duodenal ulcer observed at the Massachusetts General Hospital from 1942 through 1946. These Boston authors found that 17.8 per cent of their patients with perforation (all treated by simple closure or by suction) continued to have serious ulcer difficulty. They compared these with a group of 62 patients who had had a previous perforation and later developed renewed ulcer symptoms. In the latter group 82.2 per cent (51) were considered as failures of therapy (including 37 requiring subsequent definitive surgery, 4 who died of ulcer, and 2 who reperforated). They summarized their attitude toward duodenal ulcer perforation as follows: ". . . if followed by even a single relapse it denotes a virulent form of the disease and unless dealt with by definitive surgery bodes ill for the prognosis of the patient. Perforation may come out of a clear sky and the sky may remain clear thereafter; when the sky does not remain clear thereafter, a very bad storm is brewing."

Timpone and Gross (1950) reported a series of 16 cases of perforated peptic ulcer in which the patients were treated by immediate subtotal gastrectomy without an operative fatality.

Doll (1950) reported a series of 17 instances of perforated carcinoma of the stomach at the Central Middlesex Hospital, London. On the basis of this experience he suggested that "the risk of carcinoma is an important reason for considering partial gastrectomy as the treatment for perforated gastric ulcers in men over 30."

Turner (1951) found that there were 85.3 per cent of 143 patients (without initial definitive resection therapy for perforation) who continued to have peptic ulcer symptoms. Severe symptoms were experienced by 75.5 per cent. Subsequent definitive operative procedures were required by 38.5 per cent of those followed up. Reperforation occurred in 6.3 per cent of the latter. On the basis of these statistics, Turner was one of the chief proponents of interval gastric resection after the patients had recovered from the acute effects of perforation treated by simple closure.

Nuboer (1951) stated that primary partial gastrectomy in the treatment of perforated peptic ulcer had grown in popularity in Holland. This technique was introduced into that country by Noordenbos in 1934 (10 gastrectomies with 1 death from pneumonia) and was later used by Hustinx (52 cases with a mortality of 7.3 per cent [sic]) and by Kingma Boltjes (11 cases with 1 death). Nuboer stated that since he took over the direction of the surgical department of the Utrecht University Hospital in 1943, "partial gastrectomy has been done in nearly all cases of perforated ulcer." No attention was paid to the patient's age or to the duration of the perforation. In a few cases, in which the patient's general condition was poor on admission, a different line of treatment was followed. Most of the patients were operated upon within 9 hours of the perforation. Actually, 101 patients were treated within 9 hours, and 30 after longer periods (9 to 12 hours, 18 patients; 15 to 21 hours, 7 patients; 21 to 24 hours, 2 patients; and more than 24 hours, 3 patients).

From 1940 to 1943, 30 primary gastric resections were done in 100 cases of perforated ulcer. Since 1943, 101 patients of a total of 112 with perforated ulcer were treated by primary gastric resection. In this total group of 131 primary resections, there were 124 males and 7 females. There were 110 duodenal ulcer patients and 12 gastric ulcer patients (10 males and 2 females, in all of whom the ulcers were on the lesser curvature). In 9 males the ulcer was pyloric. The age of the patients ranged from 17 to 71 years, 8 of the patients being over 60. In all instances the operation was done by the Polya modification of the Billroth II method. The mortality among the 131 patients was 5 deaths (3.8%). This can be divided further as follows: 3 of 110 patients with duodenal ulcer (2.8%), 2 of 12 patients with gastric ulcer (16.6%), and none of the patients with pyloric ulcer (0%). In the group treated from 1940 to 1946 there were 4 deaths among 69 patients, and in the group of 62 patients treated from 1947 to 1951 there was 1 death (1.6%). Nuboer stated that the group seen during the war was treated largely without benefit of proper nutrition, anesthesia, or penicillin. There was 1 recurrence, attributed to inadequate resection.

Nuboer stated that he adopted the procedure of immediate gastrectomy for perforated ulcer for the following three reasons: (1) the frequent presence of multiple ulcers, (2) the tendency of ulcers to enlarge or persist after simple closure, and (3) the observation that gastrectomy is easier just after perforation than at a second operation. He next considered four criticisms that have been advanced against the procedure on theoretical grounds:

1. The patient seeks aid for the perforation, not for the underlying ulcer, hence simple closure is preferable. This argument falls down, he believes, because the mortality is actually lower with gastrectomy.

2. From 30 to 40 per cent of the patients have no further difficulty after simple closure. His answer to this is that from 60 to 70 per cent of them do and that this is largely prevented by primary gastrectomy.

3. Patients with perforated ulcer often give a short history indicating an acute ulcer for which resection is obviously not indicated. Nuboer's answer to this is that histologic examination of the ulcer in resected specimens almost always demonstrates a chronic ulcer with considerable involvement of the submucosa and deeper layers.

4. Patients with a recent perforation are not in shape to stand so radical a procedure as a subtotal gastrectomy. His answer to this is as follows: "Experience of a large number of cases, however, has shown that in these circumstances partial gastrectomy is tolerated extremely well by the patient—perhaps even better than closure of the perforation alone. This may be partly due to the removal of the inflamed portion of stomach." Nuboer concluded: "As the primary mortality is lower than that attained with simple suture of the perforation or with conservative treatment, and as the late results also surpass those obtained with the other two methods of treatment, I can confidently assert that partial gastrectomy should be adopted as the standard treatment for perforated peptic ulcer." While the present authors are interested in Nuboer's support of the thesis of utilization of primary subtotal gastrectomy in the treatment of perforated peptic ulcer, we are not prepared at this time to advocate the method as the "standard method." We believe, as will be shown elsewhere in this article, that the technique should be utilized when certain specific indications are present.

Tovee (1951) analyzed his 5 to 20 year follow-up data for 78 patients originally treated non-definitively for perforated ulcer. One-third of the patients were having little or no trouble. One-third were having typical ulcer symptoms, and the other one-third had undergone further operative procedures. The majority of the patients who had to have subsequent surgical procedures did so because of difficulty from a separate coincident or subsequent posterior wall ulcer.

In New York City, Auchincloss (1952) reported 13 cases of primary gastrectomy for perforated peptic ulcer without a fatality. He believes this to be a safe and logical procedure provided the surgeon is competent, the patient's condition permits, and other proper facilities are available. Dodson (1952) emphasized and defined the concept of the delayed primary gastrectomy for perforated peptic ulcer. According to him, all perforated ulcers should have definitive gastrectomy from 7 to 14 days after simple closure because it is at this time that a more favorable adrenocortical action occurs.

Mage and Payson (1952) preferred simple closure as the proper treatment of perforated ulcer, but were willing to admit the logic of primary gastric resection when the perforation is associated with a calloused posterior penetrating ulcer. In Edinburgh, Scotland, Lowdon (1952) stated that the postoperative progress of patients treated by primary gastric resection compared favorably with the progress of patients treated by simple closure. He did not think that all patients who were capable of withstanding primary resection should undergo it, but that this procedure should be reserved for those with other complications, such as hemorrhage or previous perforation.

A good recent analysis is that of Mikal and Morrison (1952), who reviewed 500 consecutive cases of acute perforated ulcer seen in the Boston City Hospital from January, 1938 to May, 1950. Previous perforation had been present in 8.6 per cent. There was bleeding in 64 patients (12.8%), and 15 of these had multiple ulcers. Four hundred and fifty-two of the patients were treated by simple closure and 11 by primary gastrectomy. Sixty-one of the patients with simple closure had subsequent definitive procedures. Twenty-three developed recurrent ulcers, but were not operated upon. Three died of reperforation. On the basis of this study these authors proposed the following indications for immediate resection, wherein all of the "safety" criteria and one or more of the "specific" criteria must be met: (1) safety criteria: (a) optimal operating conditions, (b) a patient under 50 years of age and in good general condition, and (c) a perforation less than 12 hours old; and (2) specific criteria: (a) the possibility of malignancy, (b) pyloric obstruction, (c) multiple ulcers, (d) hemorrhage, or (e) a history of previous perforation.

Kline (1952) believed that a single perforation of an ulcer did not constitute an indication for definitive surgery, but that at the first signs of recurrent activity, resection should be carried out. He reported 8 primary resections for perforation without morbidity or mortality, but failed to elucidate his criteria.

A Swedish author, Wallensten (1952), stated, "Primary resection should be performed only in

selected cases with a short interval from perforation to operation, and in young individuals." Another Scandinavian author, Lassen (1952), reporting from Denmark, summarized his attitude on primary gastrectomy for perforated ulcer as follows:

"Absolute criteria for primary partial gastrectomy for perforated ulcer cannot be set forth, since this operation would then inevitably be performed on some patients in whom subsequent ulcer symptoms would never have developed and yet would not be performed on all those in whom severe symptoms requiring secondary resection would develop.

"Simple suture, possibly followed by secondary partial gastrectomy if the latter measure is indicated by subsequent severe symptoms, is therefore recommended as the standard method of operation."

In a recent report from Athens, Greece, Carayannopoulos and Christopoulos (1952) preferred primary gastrectomy for acute perforated ulcer whenever the circumstances were favorable. They reported 69 immediate resections with a mortality rate of 2.9 per cent. They found that only 13.3 per cent of the patients treated by simple suture remained free of ulcer symptoms. It is to be noted that during the period that these primary resections were done, blood, plasma, and antibiotics were not available to Greek surgeons, which makes their low mortality rate even more enviable. Their cases of primary resection were chosen largely from a group of patients under 55 years of age and in good general condition. They preferred patients whose perforations were less than 8 hours old, but did do resections after longer intervals if the operative findings were compatible. All of their resections were done according to the Billroth II technique.

Glenn and Harrison (1952) followed up 119 patients who had had simple closure of perforated ulcers and found that 69.5 per cent later had severe manifestations or complications of ulcer. Definitive surgery was subsequently required by 40.9 per cent of the 119 patients. Nissen (1952) stated that in favorable cases of perforated peptic ulcer, gastric resection is the preferred method, because in 50 per cent of the patients treated by simple closure the ulcers remain active. A later resection is necessary in such instances, but it is technically more difficult than it would have been primarily. Samain (1952), of Courtrai, reported 23 primary gastric resections for perforated ulcer without a death. Of these operations, 21 were *ad modum* Billroth II and 2 were *ad modum* Billroth I. Samain's indications included: (1) large ulcers of the lesser curvature, (2) large or indurated duodenal ulcers, (3) multiple ulcers, (4) ulcers with concomitant perforation and past or present hemorrhage, (5) pyloric stenosis, and (6) chronic history of gastroduodenal disease.

Emmett and Owen (1953) reported 50 consecutive cases of perforated ulcer treated by primary gastric resection without a fatality. These authors concluded: "Gastrectomy for perforated ulcer is indicated in any case of perforation which is remedial to surgical treatment." In the discussion of this article, Bisgard stated that he had now performed 36 such definitive gastric resections with 1 death which was due to coronary thrombosis on the sixth day. Bisgard, of Omaha, advised resection only in selected cases with the following four indications: (1) perforated carcinoma, (2) recurrent perforation, (3) perforation with fixed pyloric obstruction, and (4) perforation with concomitant hemorrhage (usually due to multiple ulcers according to Bisgard). In a further discussion of the same article, Baker, of Seattle, cautioned against routine gastric resection for all perforated duodenal ulcers, especially the acute ones. He advised resection only for patients with duodenal ulcers with a "convincing past history" and stated that usually these, at operation, will have an ulcer with a "fibrous edge." In still further discussion, DeBakey, of Houston, stated that his series of primary resections for perforated peptic ulcer had now grown to 55, still with only 1 death. One of us (H.N.H.) stated the indications for definitive resection much as they will be presented in this article; and Mathewson, of San Francisco, stated that in a series of 185 patients operated on for perforated ulcer, his group had done only 5 resections. Furthermore, Mathewson stated that of the patients given follow-up study, 72 per cent had no further symptoms following simple closure and only 9 per cent required further surgical therapy. Few, if any, recent reports have cited such good results following simple closure.

Calvi (1953), of Asti, Italy, stated that the late Prof. Ottorino Uffreduzzi was one of the first in Italy to advocate primary gastric resection in the treatment of perforated peptic ulcer. Calvi himself reported on the method as used in a series of 56 patients with 3 deaths (5.4% mortality). These 56 patients were part of a total group of 69 patients, the other 13 being treated by simple closure with 1 death. Edwards and Jennings (1953) reported on 8 patients with acute perforation of a peptic ulcer treated by immediate subtotal gastrectomy with no deaths.

Brockman, Cooley, and DeBakey (1953) studied a series of 44 cases of primary gastric resection

with 1 death. They used the Billroth I procedure in only 1 case, but declared their intention to use it more frequently in the future. They were impressed with the smoothness of the postoperative course in these cases. Ochsner (1953) stated that he had begun to do immediate resections for perforated peptic ulcer a year previously and had so far done 28 such operations. He stated that he is "increasingly convinced that perforation is an indication for resection at some time."

Miller, Mersheimer, and Silverstein (1953), on the basis of an analysis of 106 gastroduodenal perforations, of which 88 were treated surgically and only 1 of these by subtotal gastric resection, and on the basis of a study of the literature, drew up the following indications for immediate subtotal gastrectomy: (1)coexistent perforation and hemorrhage, (2) perforated gastric ulcer in a female patient, (3) perforation of a malignant lesion, and (4) indications which "require evaluation:" (a) long history of duodenal ulcer disease, (b) recurrent perforation, and (c) coincident perforation and pyloric obstruction. As criteria that must be met before proceeding with immediate subtotal gastric resection, these authors listed the following: (1) patient in good constitutional condition and less than 50 years of age, (2) perforation of less than 12 hours' duration, (3) no shock, (4) no extensive peritonitis, and (5) operative and anesthetic facilities comparable with those available for an elective gastrectomy.

Stabins (1953), of Rochester, New York, studied a series of 249 patients with perforated duodenal ulcer. Twelve patients were treated conservatively with 11 deaths. The other 237 patients were treated surgically by some variety of simple closure, there being 30 deaths (12.7%) in this group. Of the 207 patients who survived the initial treatment, 167 were available for follow-up. Of these, 15 (8.9%) reperforated, further definitive surgery was necessary in 61 (36.5%), and major sequelae developed in 109 (65.1%). The major sequelae included the 15 reperforations, 14 cases of active ulcer, 57 instances of pyloric obstruction, and 23 cases of hemorrhage. On the basis of these poor results demonstrated by careful follow-up studies after simple closure, Stabins postulated (although he did not report having so done as yet) that "if more than simple closure is to be considered, gastric resection is the only procedure fundamentally sound." In the discussion of this article, Ravitch, of New York, stated that he had used immediate gastric resection under these circumstances with good results. On the other hand, Bowers of Memphis did not advise such a procedure.

Gilmour (1953) reviewed 206 cases of perforated peptic ulcer seen at the Royal Victoria Infirmary, Newcastle-on-Tyne, and also found a definite relationship between chronicity, as determined by history, and poor results following simple closure. Follow-up studies were made of 181 patients. Among 116 with clinically acute cases, there were 22 per cent with poor results (42% of the 22% were reoperated upon), while among 65 with clinically chronic cases, there were 100 per cent with poor results (63% of these were reoperated upon). Furthermore, among the total group of 119 with acute ulcers there were no deaths (0%) following simple closure, while among the total group of 87 with chronic ulcers there were 13 deaths (15%) following simple closure. The over-all mortality was 6.3 per cent. Gilmour's data, coupled with those of Jones and Doll (1953), would indicate that chronicity, as determined by the history, can be considered as an indication for immediate gastrectomy for perforated peptic ulcer.

Beahrs, Duncan, and Vadheim (1953) reported on the 114 surgically treated patients with perforated peptic ulcer who were operated upon at the Mayo Clinic during the decade preceding January 1, 1951. Of the 114 operations, 108 were simple closures and 6 were primary gastric resections. Three of the patients treated by simple closure died, while all of the patients treated by primary gastric resection recovered. Three of the latter operations were done for perforated gastric ulcer.

In an excellent article which analyzed all three methods of treatment for perforated peptic ulcer, Jones and Doll (1953) reported on 715 patients with perforated peptic ulcers who were admitted to the Central Middlesex Hospital, London, during the period from 1938 to 1951. In 340 patients treated between 1948 and 1951, the over-all mortality rate including the cases undiagnosed until after death was 7.9 per cent. Twenty patients were not operated upon, in most of the cases because the condition was not diagnosed or the patient was too ill; 17 died. In 301 cases simple closure was done with 10 deaths, a mortality rate of 3.3. per cent. Nineteen patients were treated by immediate partial gastrectomy without a death; in the first 6 months of 1952 the number so treated was increased to 30.

The statistical analysis of this series was especially scientific. Not only were probabilities utilized, but each factor was considered separately, correction being made for age, sex, and other differences before the influence of the factor was formulated. Thus, it was shown that differences

in the fatality rate in men and women could be adequately explained by the greater proportion of women among patients with gastric perforations and among those in whom operation was delayed more than 12 hours. On the other hand, the age of the patient, the site of the ulcer, and the duration of delay all affected the fatality independently of one another. The excess mortality of gastric as compared to duodenal ulcers was striking; it occurred in each age group, but to a significant extent only when the duration of delay was *less* than 6 hours. This interesting fact may have been observed because very large perforations occur more readily in gastric ulcers resulting in massive soiling of the peritoneum and also in ulcers which are admitted early because of urgent symptoms. A statistical point concerning gastric ulcers which has a bearing on indications for immediate gastric resection reads as follows: "Seventy-four patients treated by simple closure for perforated gastric ulcers and an equal number of comparable patients with perforated duodenal ulcers were followed up after 2 to 12 years. Eight (11%) of the 'gastric' patients, but none of the 'duodenal' patients, are known to have died of carcinoma of the stomach. Seven (5%) of all the patients died of peptic ulcer."

The influence of two factors in the history of the patient was quite striking in the report of Jones and Doll. In 18 per cent of the patients with a history of dyspepsia of less than 12 months before simple closure, a subsequent gastric operation was required; this is an appreciable figure. However, if the history of dyspepsia was longer than 12 months, a subsequent gastric operation was required in 41 per cent (2.3 times as much). Similarly, in patients without a previous diagnosis of peptic ulcer before simple closure, a subsequent gastric operation was required in 22 per cent, also an appreciable figure. However, if a previous diagnosis had been made, a subsequent gastric operation was required in 50 per cent (2.3 times as much). Jones and Doll summarized their views concerning immediate gastric resection and its relation to other treatment of perforated peptic ulcer as follows:

"Immediate partial gastrectomy has been shown to be a practicable method of treatment, compatible with an excellent immediate prognosis. As most ulcers which perforate acutely are on the anterior wall of the duodenum, the operation is technically easier to perform as an emergency for perforation than for bleeding, when the ulcers are often posterior and penetrating. It is the method of choice *for a surgeon experienced in the technique* when: (a) the perforation is gastric, and, although the ulcer may appear simple, there is in fact a considerable risk that it may hide an unrecognized carcinoma; (b) the patient gives a history of more than one year's dyspepsia and an ulcer has been diagnosed previously (because a high proportion of such patients will require a further operation if treatment is limited to simple closure); or (c) perforation and haemorrhage from an ulcer occur concomitantly.

"We do not think it likely that immediate partial gastrectomy will be shown to be the method of choice for all perforations. It is possible that the immediate prognosis may be even better than that with simple closure of the perforations, by eliminating the deaths due to further complications arising from the persistence of the ulcer; but we have little firm knowledge of the ultimate results. . . . We do not, therefore, think that the operation can be justified as a routine procedure in duodenal ulcer patients in whom the ulcer has never previously been diagnosed and in whom the late prognosis with simple closure is reasonably satisfactory. Particularly is this so when the patients have no memory of prolonged discomfort from their ulcers to set against the symptoms of the dumping syndrome (should they arise).

"Surgical closure of the perforation is now a highly satisfactory method of treatment, so far as the immediate prognosis is concerned. It is reasonable to continue to use it in the absence of positive indications for either of the other methods."

Nonoperative gastric aspiration. Within the past decade, several British authors have advocated an initial conservative management of acutely perforated ulcers, utilizing continuous gastric aspiration.

Bedford-Turner (1945) was probably the first to report a series of cases in which the patients were treated initially in this manner. There were 6 patients in his series, and each made an uneventful recovery. Taylor (1946) treated 28 patients with perforation by gastric aspiration. There were 3 deaths unrelated to the conservative therapy and 1 death that perhaps would have been avoided by operation. Visick (1946) reported on 14 cases with 3 deaths that might have been prevented by operation. He agreed that about 50 per cent of the patients with perforated ulcer, who are treated conservatively, could be expected to suffer a severe relapse within 5 years.

Bingham (1948) reviewed 62 cases of ulcer perforation in which the patients had been treated conservatively (including 5 of his own). He found a gross mortality rate of 11.3 per cent and a mortality of 4.84 per cent attributable to failure

of the nonoperative management. He felt that these results were sufficiently good to justify further trial of the method and advocated its use especially in areas where skilled surgical talent was not immediately available. In this country, Seeley *et al.* (1949), and Seeley (1951) found that the immediate results of conservative treatment indicated further trial of the method. Beattie (1951) treated 40 patients conservatively with a mortality rate of 10 per cent and a failure rate of 12.5 per cent. Thirteen of the 36 patients who survived developed pneumonia or atelectasis. Consideration of this analysis led him to abandon conservative therapy in favor of immediate laparotomy.

Peritoneal culture following perforation. Fallis (1938) reported a positive culture in one-third of 36 cases of perforated ulcer. Staphylococci, streptococci, and colon bacilli were encountered. His mortality rate for patients with positive culture was double the rate for the series as a whole. Meyer (1940) found 6 positive peritoneal cultures in 15 cases of gastric ulcer perforation. Staphylococci and streptococci were most frequently found.

DeBakey (1940) stated that in the early period following perforation few organisms may be found because of the bacteriostatic effect of the hydrochloric acid from the stomach; however, during the later stages the inhibition due to the acid is no longer present and streptococci and colon bacilli are then found more frequently. Parenthetically, it can be mentioned that the liberation of hydrochloric acid into the free peritoneal cavity has another action besides a bacteriostatic one. This action is to produce peritoneal irritation and shock. The importance of the local loss of plasmalike fluid in cases of perforated ulcer was demonstrated by Blalock (1935).

Henry (1942) found that he could obtain a higher incidence of positive cultures by collecting some of the peritoneal fluid for implantation in the culture medium than when he submitted only a swab dipped in the fluid. He contended that bacterial infection of the peritoneum is a major cause of death in perforated peptic ulcer. Burden (1944), like DeBakey (1940), found that early cultures of the peritoneal fluid after perforation were usually sterile.

In his report, previously referred to, Auchincloss (1952) reported an immediate gastric resection in a 50 year old woman for a 72 hour old perforated marginal ulcer with a large local abscess. Culture was positive for the Streptococcus viridans and the hemolytic Streptococcus. Postoperatively, she was treated with terramycin and recovered uneventfully, having been discharged on the fourteenth day after operation. Her temperature had been normal for the preceding week. Auchincloss found negative cultures in all 12 of his cases of perforated duodenal ulcer in which cultures were taken. The interval between perforation and operation ranged from 4¼ hours to 24 hours.

The influence of sex on the prognosis in perforated peptic ulcer. A strange and unexplained vagary of perforated peptic ulcer is that while the incidence is lower in women than in men, the mortality rate is higher.

Bager (1929) reviewed 1,495 cases in Sweden and found that the female mortality rate was 43.3 per cent compared with the male mortality of 28.8 per cent. Judine's (1939) female mortality was 37.5 per cent as opposed to 11.4 per cent for men. Lang (1935) and Susman (1939) each noted a higher female mortality rate. DeBakey and Odom (1940) found in the Charity Hospital (New Orleans) series that 25 per cent of the females and 18.8 per cent of the males died. In a series of 160 cases of perforated peptic ulcer Mayo and Fitchett (1950) reported a 42.9 per cent mortality rate for women and 11.1 per cent for men.

One hundred and four patients with perforated peptic ulcer who were treated by simple closure were followed up by Tovee (1951). Six of the patients in this group were female. Three of these had to undergo further gastric surgery. Two others had recurrent ulcer symptoms and another died of heart disease, but not before she developed typical ulcer symptoms. This author concluded: "On the basis of this series the future of a female patient with a perforated ulcer is not too bright." Lassen (1952) analyzed a series of 79 perforations and found a mortality of 33 per cent in females compared with a male mortality of 13.7 per cent. He too expressed the opinion that "... the subsequent course is less favorable in women than in men." Emmett (1953) stated that in his small series of 46 primary gastric resections for perforated ulcer, he noted no difference between the results in males (40 patients) and females (6 patients).

DISCUSSION

One aspect of perforated peptic ulcer that is only indirectly related to the major issues of this article is worthy of brief mention, i.e., the reliability of x-ray diagnosis of pneumoperitoneum.

Regarding the roentgen diagnosis of free peritoneal air, Johnson (1937) reviewed 42 cases of proved perforated ulcer that had been examined

with x-rays for free air. There was visible pneumoperitoneum in five-sixths of the cases. He suggested that roentgenograms be taken as early as possible following perforation because small amounts of air are rapidly absorbed. Williams and Hartzell (1940) found that they were able to procure positive diagnoses in 89.7 per cent of cases in the left lateral decubitus position (68 cases) and in only 76.2 per cent of those in the upright position (227 cases). A review of our small series of cases would indicate that if there is uncertainty of diagnosis, both left lateral decubitus and erect films should be taken. However, our experience with other acute perforations indicates that not uncommonly the diagnosis is clear without roentgenograms. It should be pointed out that 2 of our 3 patients who showed no free air on the left lateral decubitus film had had a previous perforation. The formation of adhesions might prevent the pocketing of air in the perihepatic region.

On the basis of the evidence from the literature and from our own cases, we would like to consider the answers to two questions: Is immediate gastrectomy safe? and Which cases should be treated by primary gastric resection?

Is immediate gastrectomy safe? In our series, pulmonary atelectasis occurred as a postoperative complication in 3 of 13 cases (23 per cent). It is of interest that Olson and Norgore (1946) reviewed all the cases of perforated peptic ulcer admitted to the same hospital (King County) from 1938 to 1944 and found that 25 per cent of the surgical deaths were due to pulmonary complications. Turner (1951) encountered major pulmonary complications in 41 (22%) of 185 patients with perforated ulcer who were treated by simple closure. Glenn and Harrison (1952) found that one-half of their postoperative complications were pulmonary, with an incidence of 23 pulmonary complications among 139 cases (16.5 per cent). This high incidence of pulmonary complications is not surprising when one considers splinting of the lower thorax incident to protection of the upper abdomen from painful movement. This occurrence seems not to depend significantly upon whether simple closure or immediate gastrectomy is used, particularly since the authors of the present review use the same type of incision (upper midline) for both procedures.

One of the widely accepted tenets of good surgical practice is that an extensive operative procedure in an infected field should be avoided if it is possible to do so. Undoubtedly there is ample reason to justify this contention. There are, however, many factors that should be considered regarding the status of infection in each individual case when one decides for or against primary resection for perforated ulcer. If immediate gastrectomy is otherwise indicated in the case in question, should one perform only a simple closure of the perforation when purulent exudate is in evidence? In infection, where is the significant line of demarcation to be placed between the presence of bacteria only and the presence of frank pus? How much of the decision should depend upon the local peritoneal reaction and how much upon the general reaction of the patient to the peritoneal infection and irritation? What will be the effect on healing of the degree of peritonitis that is present? How have these factors been modified by the advent of antibiotics and blood volume replacement techniques? The answers to these vital questions must await further experimental work and clinical observation. Until we have specific answers, we cannot know what the safe limits of peritonitis are for immediate gastrectomy. The experiences of others and our own brief experience would indicate that primary gastric resection can be performed with acceptable morbidity and mortality in most instances in which the perforation is less than 12 hours old and in selected cases of much longer duration. The safety of primary resection must be evaluated in each individual case, as it depends on the patient's general condition and the operative findings.

The bulk of experience indicates that the prognosis of the female patient with a peptic perforation is poorer than that of the male. Our brief experience with primary gastrectomy bears this out, for the only 2 patients who have done poorly in our series were female. Immediate resection was the only possible therapy in 1 of them (D.R.) because of the presence of a large callused perforation that was not amenable to simple closure. The other patient (T.G.) had difficulty because of unrecognized hypoproteinemia. Reports in the literature stress not only the high mortality among females but also the poor prognosis for ulcer control with nondefinitive initial therapy. The reason for this sex difference is yet to be elucidated, but it cannot be disregarded in evaluating the safety of primary resection. However, it is only fair to point out that, in disagreement with this hypothesis of a sex difference, Jones and Doll (1953) demonstrated that in their series the increased mortality in females could be explained by the facts that patients of this sex are more apt to have gastric ulcers and are more apt to delay treatment beyond 12 hours. One should perhaps insist that the other safety factors be more favorable in the female patient than in the male before proceeding with primary gastrectomy.

The safety of immediate gastrectomy depends largely upon the general condition of the patient and the availability of adequate operative and postoperative facilities. The surgeon must be well trained in the performance of gastric surgery. The safety is influenced by the physiologic age rather than the chronologic age of the patient.

When these factors are properly considered and when they form the basis for sound judgment in each case, then primary gastrectomy *is* a safe operative procedure. Individualization is the keynote to a low mortality rate with this procedure. Burden (1944) so aptly stated, "The mortality of an operation in a thousand reported cases may be 5 per cent but for the patient who dies it is 100 per cent."

Which cases should be treated by primary gastrectomy? Because of technical reasons there are some patients with perforation who must be given immediate gastric resection. Sometimes this necessitates a compromise with the safety factors discussed previously. Included in this group of local factors are large perforations in callused ulcers, fixed pyloric obstruction (rarely, in the poor risk patient; gastrojejunostomy may be a satisfactory alternative), perforated carcinoma of the stomach, and a concomitant bleeding posterior ulcer. The importance of such a combination of perforation and hemorrhage has recently been re-emphasized by Kahn and Kumpuris (1953). Jones and Doll (1953) reported that 10 per cent of their 340 patients with perforated peptic ulcer developed the perforation within 2 weeks of having had melena or hematemesis; most commonly the hemorrhage had occurred within the preceding 24 hours. Otherwise the safety factors must be considered first, and then the prognosis for the particular individual's ulcer diathesis must direct the decision. One must be certain that the cure is not worse than the disease.

In the following discussion, the patients with perforated peptic ulcer who are in good enough condition to have surgical operation are divided into three groups of approximately equal size with indications for the particular surgical treatment in each group. It is recognized that there are additional patients with this condition who are not fit for any operation. Their number varies in different hospitals, but they generally represent a minority of the total admissions for perforated peptic ulcer. These patients are not included in the following discussion.

One may reasonably expect at one extreme that one-third of the unselected patients with perforated ulcer who are treated by simple suture will have no further ulcer difficulty. It would seem unwise to burden these patients with the inconvenience, and sometimes the disability, of postgastrectomy sequelae.

At the other extreme, approximately one-third of the patients have a reasonable expectation of further serious ulcer difficulty and life-threatening complications which eventually would require further surgical therapy. If the criteria of safety are satisfied, these are the patients who should be given primary gastrectomy, for there is little point in subjecting them to two operations if one will do. The indications from the history for placing a patient in this category are: (1) multiple ulcers, (2) bleeding concomitantly or previously, (3) previous perforation, and (4) unreliability on the part of the patient in co-operating with a postoperative medical regime for the control of his ulcer. The last indication is particularly applicable in chronic alcoholics. Not only do they fail to accept medical management, but they repeatedly aid and abet ulcerogenesis with alcohol ingestion. Many such patients are encountered in a county hospital practice such as our own. Certain additional findings at operation may serve as indications for immediate resection, namely, large perforations in callused ulcers, fixed pyloric obstruction, and perforated gastric ulcers (because of the danger of carcinoma).

We would like to emphasize that if primary gastrectomy is performed there should be no compromise in the extent of resection. Regardless of the conditions under which it is performed, resection leaving more than 25 per cent of the stomach invites marginal ulceration, and possibly this is true particularly with duodenal ulcers which have perforated.

We are likewise convinced of the superiority of the Billroth I anastomosis over the Billroth II, and believe that it should be used with primary resection for perforated ulcer as well as with elective resections whenever possible. Because the perforated ulcer is usually anterior, the duodenum is apt to be mobile, which often makes it easier to do a Billroth I resection for acute perforation than for some elective indications.

The patients in the middle one-third between these two extremes may be expected to have mild to moderate recurrent ulcer symptoms. There is no satisfactory method at operation of distinguishing these patients from those in the one-third who will have no further trouble. Therefore, it would be wise to treat this two-thirds by simple closure and to perform an elective gastric resection if and when ulcer symptoms recur. This method of selection and individualization will give the greatest chance for a satisfied patient.

SUMMARY

1. The question of treating perforated peptic ulcer patients by primary subtotal gastric resection is discussed.

2. Our series of 13 cases is analyzed from the standpoint of safety of the procedure.

3. Opinions and statistics of others in the literature have been considered with the purpose of defining reasonable criteria of safety and indications for immediate gastrectomy.

CONCLUSIONS

1. Immediate subtotal gastrectomy for perforated ulcer is a safe procedure when used on patients in good general condition. It must be done only when adequate facilities and personnel are available.

2. Even though our series is small, it supports the contention in the literature that women have a poorer prognosis than men for perforated peptic ulcer. Consequently, the safety factors should be more strictly observed before a female patient is treated by immediate gastric resection.

3. Approximately one-third of the patients with perforated peptic ulcer should be treated by primary gastric resection, as based on the patient's history. This group includes those with multiple ulcers, previous perforation, and concomitant or previous hemorrhage, and those who cannot be depended upon to co-operate with the postoperative medical management of the underlying ulcer disease. The last indication applies especially to alcoholics and to many patients seen in a county hospital. Jones and Doll (1953) emphasize the importance of two additional factors in the patient's history, namely, the history of epigastric distress for more than 1 year and a previous diagnosis of peptic ulcer. We are not ready as yet to accept these as absolute indications, but may adopt them as relative indications.

4. Certain additional patients with large perforations in callused ulcers, fixed pyloric obstruction, and perforated gastric ulcers (because of the danger of carcinoma) should have immediate resection as based on the findings at operation.

5. The remainder should be treated by simple suture and followed up closely so that elective resection may be done at the first sign of recurrent ulcer symptoms.

6. When primary gastrectomy is employed, three-fourths of the stomach must be removed, and we feel that the Billroth I anastomosis is preferable. The Billroth I resection is easy in most cases of perforated ulcer because of the anterior location of the perforation in the majority of instances.

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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Discussion on the Management of Injuries of the Nose and Upper Jaw. E. G. COLLINS, D. S. MIDDLETON, and others. *Proc. R. Soc. M., Lond.*, 1953, 46: 473.

The discussants stated that in the early treatment of faciomaxillary injuries, excision of the skin edges should be confined to devitalized tissue, and no extensive débridement should be attempted. Tension on skin wounds must be avoided. Where there is a badly comminuted fracture involving one of the paranasal sinuses below the wound, only loose pieces of bone should be removed.

In dealing with simple fractures of the nasal bones, a more radical approach should be advocated. In injuries to the frontoethmoidal area, epiphora can usually be avoided by disimpaction and good alignment of the fragments, but occasionally a dacryocystorhinostomy may prove necessary. It was pointed out that the attempt at eradication of mucous membrane from a sinus which shows no macroscopic evidence of infection is a harmful objective since, at best, the re-formed mucosa is not comparable with normal healthy mucosa.

Sinus treatment in any severe compound comminuted fracture of the frontoethmoidal region which is not clinically infected should be limited to removal of loose and devitalized pieces of bone only; any pieces that could survive should be retained.

Fractures of the facial bones involving the zygoma are relatively common. The commonest injury is simple fracture dislocation with separation at the frontozygomatic, sphenoid, and temporal suture lines. When the trauma has been severe it may be accompanied by fracture of the body of the bone, comminution of the floor of the orbit and maxillary bone and, occasionally, fracture of the ethmoidal plate and nasal bones. The downward displacement of the lateral wall of the orbit, to which is attached the palpebral ligament, lowers the level of the outer canthus. The eye is no longer supported in its transverse axis; this causes a vertical diplopia. Cyclophoria or deviation of the vertical meridian of the cornea from its normal vertical axis may occur if the attachment of the inferior oblique muscle to the lacrimal bone is damaged. Intorsion of the eye results from unopposed action of the superior oblique muscle. Its presence is suspected if the patient tilts the head on viewing an object. It is one of the most difficult complications to treat and may not be corrected by lenses.

In traumatic injury, it is important to ascertain whether there has been any previous nasoantral infection or any discharge of cerebrospinal fluid from the nose which would indicate dural rupture.

STEPHEN A. ZIEMAN, M.D.

What is the Value of the So-called Prophylactic Neck Dissection in the Treatment of Carcinoma of the Oral Cavity? (Que vaut l'evidement dit "prophylactique du cou dans le traitement des cancers de la cavite buccale?). MARCEL DARGENT. *Presse med.*, 1953, 61: 165.

The application of a prophylactic neck dissection in the treatment of metastatic cervical node carcinoma has not received universal approval. In order to assess the value of this procedure, the author has made a careful analysis of the clinical, pathologic, and follow-up data of a large number of cases of intraoral carcinoma, in each of which a prophylactic neck dissection had been performed.

The term "prophylactic" applied to routine neck dissections is improper because the operation is not performed to prevent cervical metastasis but rather to remove it before it has become clinically evident. A better term for this routine procedure would be a neck dissection of "principle."

The material on which the article is based consists of 335 cases of intraoral carcinomas, including 121 cases of carcinoma of the tongue, 82 cases of carcinoma of the floor of the mouth, and 81 cases of lower lip carcinoma. After irradiation of the primary lesion, a radical block dissection of the neck was performed on all of the patients, whether or not cervical nodes were palpable. The technique of neck dissection was similar to that used in this country with the exception that the mandibular branch of the seventh nerve and the spinal accessory nerve were preserved. In patients with carcinoma of the lower lip and floor of the mouth a bilateral, suprahyoid dissection was the procedure employed. A bilateral radical neck dissection performed in two stages was employed for carcinoma situated in the midline of the tongue.

There was one postoperative death, a mortality of 0.3 per cent. The complications were minimal. They included wound seromas, thoracic duct drainage which ceased following repeated aspirations of the wound, and edema and cyanosis of the face in those patients in whom both jugular veins were removed. With the use of antibiotics, postoperative infections rarely occurred. In the earlier cases, section of the spinal accessory nerve resulted in severe shoulder disability, a complication which was avoided by preserving the nerve.

Histologic examination was made of all pathologic material. It is interesting that positive lymph

nodes were found in 105 of the 335 cases. Of those patients in whom no nodes were palpable clinically, 22.6 per cent had positive nodes, while of those in whom nodes were palpable, 38.9 per cent were positive.

Follow-up studies were made on 203 cases comprising the three most frequently occurring tumors —of the tongue, the floor of the mouth, and the lower lip. Thirty-five per cent of the patients had 5 year arrests. A comparable series of 174 patients in whom no neck dissection was performed showed a 5 year arrest in 23 per cent.

The causes of cervical recurrence following radical neck dissection are analyzed as follows:

Technical errors. As an example, incomplete dissection of the submental space for cancer of the lower lip and incomplete dissection of the subclavian triangle and digastric pocket in cases of cancer of the tongue.

Tactical errors. For instance, the performance of a suprahyoid neck dissection only for a case of carcinoma of the lip with positive nodes, and the failure to perform a bilateral neck dissection for certain carcinomas of the midline of the tongue.

The extreme malignancy of the tumor. Some tumors in this region are encountered in which there is a rapid and widespread lymphatic involvement following operation. It cannot be denied that the operative trauma may have been a factor in this overwhelming metastasis.

The study indicates that a routine neck dissection can be performed with extremely low mortality and morbidity. To withhold the operation until cervical node metastasis appears results not only in a more difficult procedure, requiring the sacrifice of essential nerves, but allows unnecessary spread of the tumor. The results are excellent for carcinoma of the lip. For carcinoma of the tongue and floor of the mouth, the 5 year arrests are little better than when the neck dissection is postponed until nodes are involved. However, when the correct time for the dissection in relation to the treatment of the primary lesion is determined, the number of long term survivals will increase.

ROBERT A. WISE, M.D.

A Technique of Immediate Bone Grafting in the Treatment of Benign and Malignant Tumors of the Mandible and a Review of 17 Consecutive Cases. JOHN J. CONLEY. *Cancer*, 1953, 6: 558.

The loss of a portion of the mandible interferes with the aesthetic and functional qualities of the lower third of the face. In some instances the continuity of the mandibular arch may be immediately restored by the use of a free osteoperiosteal bone graft held in position by a special vitallium plate and screws (Fig. 1). It is emphasized that no plan for reconstruction should be allowed to compromise the technique of radical excision for cancer.

Immediate free bone grafting may be indicated after mandibular resection for cysts, benign tumors, adamantinomas, and cancers of the alveolus. The procedure is contraindicated when resection of the tumor involves an extensive loss of tissue, when infection is present, and when the tissues have been heavily irradiated. A bone graft should not be used when there is doubt as to the stability or viability of the intraoral suture line.

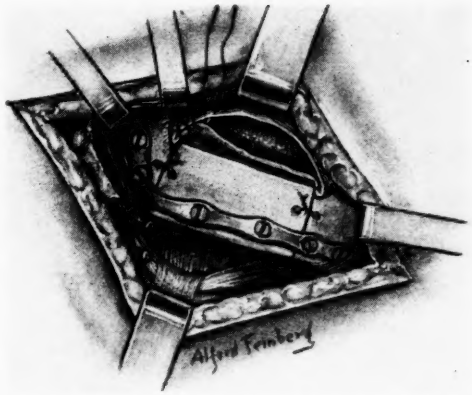


Fig. 1 (Conley). Osteoperiosteal iliac bone graft in mandible fixed in position with special modelled plate and screws.

Among 17 consecutive cases, the graft was successful in 15. In one of the 2 failures, a regraft was later accomplished. Excellent cosmetic and functional results were obtained in most instances.

ROBERT A. WISE, M.D.

EYE

Reconstruction of the Lower Fornix by a Pedicled Graft from Skin of the Upper Lid. K. N. SHUKLA. *Am. J. Ophth.*, 1953, 36: 694.

The author presents the case of a shallow lower fornix which would not allow for a prosthesis to be adequately fitted, and there was danger of obliteration. A plastic operation was decided upon, to enable the patient to wear the necessary cosmetic prosthesis.

The operative technique is described in detail. The conjunctiva of the lower lid was incised close to the lid border and allowed to retract back as far as possible. The upper lid was then incised through the skin surface posteriorly from the lid edge, approximately as far as the conjunctival defect was measured in the lower lid. The skin from the upper lid flap was then dissected free down to the lid edge; sutures were used to pull the skin flap inferiorly, and everted. This skin was then sutured into the defect in the lower lid, conjunctiva, or against the raw surface of the lower lid and skin surface toward the conjunctival side. This formed a small bridge of skin from the lower lid to the upper lid. At the end of approximately 4 or 5 days the bridge of skin

was incised and the socket was opened. The final result was a combination of skin and conjunctival lining of the lower lid. The upper skin defect or scarring was of no consequence.

In the past, many authors have claimed that the combination of skin and mucous membrane as a lining for a socket is not satisfactory because of an offensive discharge which collects on the prosthesis. It is the author's contention, however, that this disadvantage did not take place in his case. The skin of the upper lid was selected because of its softness and thinness. EARL H. MERZ, M.D.

Nystagmus Electrically Recorded. HELGE HERTZ and NIELS RISKAER. *Arch Otolar.*, 1953, 57: 648.

A quantitative investigation of the vestibular function involves objective registration of nystagmus. Mechanical methods of registration are uncomfortable and probably hinder the movements of the eyes. Eye illumination for optical recording inhibits nystagmus.

An attempt has been made to devise a method for quantitative investigation of the sensitivity of the ampullar cristae, the function of the vestibular nuclei, the co-ordination of eye movements, and the sensation and after-sensation of turning. Rotation in darkness to avoid fixation is adequate for stimulation. Nystagmus registration must be independent of the rotation. The horizontal nystagmus and vertical components must be separately recorded. The sensation of rotation must be recorded on the paper with the nystagmus, where also the angular speed of the chair is recorded in terms of degrees per second.

A motor-driven and controlled Barany chair was used. Four electrodes were placed on the face of the patient and ink-writing pens were employed to record the nystagmus graphically.

Nystagmograms of a few normal and abnormal cases are presented. It is the authors' hope to produce in the future normal material that can be statistically treated. With knowledge of the normal limits, various types of damage to the vestibular system can be investigated and compared with the normal condition. Eventually this will enable adequate integration of the vestibular apparatus to the cerebellar, ocular, and proprioceptive centers. JOHN R. LINDSAY, M.D.

Vascular Lesions of Diabetes Mellitus. JOSEPH I. GOODMAN. *Am. J. Ophth.*, 1953, 36, 957.

Diabetic retinopathy is a distinct entity. The retinal lesions are not seen in similar form or distribution in any other disease. The earliest stage of retinopathy consists in the development of discrete, round, punctate lesions, usually about dilated terminal venules in the macular and paramacular region. The capillary lesions of the retina are very likely specific for diabetes. Histologic studies confirm that the earliest organic changes in the retina are actually punctate capillary microaneurysms, located in the inner nuclear layer, which vary from 30 to 60 microns in diameter. A few shiny, irregularly shaped punctate exudates are seen later in the deeper layers of the retina, either above or below the fovea; then the veins become dilated, cyanotic, and irregular. The final phase may be marked by hemorrhages in the vitreous with sequential proliferation of fibrous tissue and neovascularization producing the picture of retinitis proliferans, in which the contraction of scar tissue may result ultimately in detachment of the retina.

Diabetic retinopathy and Kimmelstiel-Wilson's disease have in common, capillary dilatation, localized degeneration, proliferation of the vessel wall, and hyaline deposition. The retinal lesions precede the renal lesions. This type of lesion may be related to disturbances in adrenal corticosteroid balance and the consequent effect on the supporting fibrous tissue of the smaller vessels. Hence there may be some hope of mitigating this damage by better treatment of the diabetes, thereby avoiding stress. JAMES E. LEBENSOHN, M.D.

Geniculocalcarine Injuries in War Casualties. NORMAN S. JAFFE and LLOYD S. DURKIN. *Arch. Ophth.*, Chic., 1953, 49: 591.

In lesions of the optic radiations the fields become more congruous as the posterior portion of the radiations and the occipital cortex are reached. Macular sparing is common in vascular lesions of the occipital cortex and subjacent white matter, but injuries cause splitting of the macula, with which normal central acuity may be retained. A radiation defect is usually accompanied by other symptoms, while occipital lesions are generally silent. The presence of small hemianopic scotomas of irregular outline and steep margin indicates cortical or subcortical damage. Also, when complete blindness is followed by recovery of an entire half-field, the occipital cortex is usually involved. This initial blindness may last from minutes to days. A transverse bullet wound causes a bilateral homonymous hemianopia of quadrantic type, the lower quadrants being involved, since the patient does not survive a lesion at the base of the brain.

Details are presented of 12 cases, including 3 cases of homonymous quadrantanopsia, 4 cases of homonymous hemianopia, 4 cases of bilateral homonymous hemianopia, and 1 case of homonymous paracentral scotoma. All these patients were treated at the U.S. Army Hospital, Fort Campbell, Kentucky. JAMES E. LEBENSOHN, M.D.

Minimal Amount of X-Ray Exposure Causing Lens Opacities in the Human Eye. DAVID G. COGAN and KNUD K. DREISLER. *Arch. Ophth.*, 1953, 50: 30.

It seems that the rabbit lens and the human lens have the same order of susceptibility, but the latent period is several times as long in the case of human beings as in the case of rabbits.

The cataractogenic dose and the skin erythema dose are similar when energies of 200 kilovolts are used. Energies of less than 200 kilovolts would be

expected to be cataractogenic only when the doses are greater than necessary to cause the skin erythema. Energies greater than 200 kilovolts would be expected to be cataractogenic with doses less than the skin erythema dose.

As many persons as possible were contacted and examined, whose eyes had been exposed to a known amount of radiation, so that it could be determined just what was the least amount of exposure which could cause an opacification of the lens that was ophthalmoscopically or biomicroscopically visible.

In a series of patients who had received 400 roentgens (energies of 100 kv.) or less, to the eye, no lens opacities were found. In 1 of 3 patients who had received 600 roentgens, in the one patient who had received 800 roentgens, and in the one who had received 1,000 roentgens, lens opacities were found. The time of onset of lens changes following irradiation in these 3 patients was 2½ years for the first, between 1½ and 4½ years for the second, and less than 10 years for the third patient. In the 2 patients who had received 2,400 roentgens, mature cataracts had developed 1 year and 4 months, and 3 years, respectively, after the irradiation.

The threshold dose for the production of lens opacities with the energies ordinarily employed (100 to 200 kv.) appears to be of the order of 600 roentgens, but more observations are needed in the long range follow-up of patients whose eyes have been exposed to x-rays in the dosage level of 400 to 1,000 roentgens. JOSHUA ZUCKERMAN, M.D.

Complications Following Cataract Extractions. A. A. CINOTTI and JERRY HART JACOBSON. *Am. J. Ophth.*, 1953, 36: 929.

Among 1,001 cataract operations, of which 749 were intracapsular and 252 were extracapsular, complications occurred in 229 eyes. Little difference was noted between intracapsular and extracapsular extractions, although loss of vitreous following the extracapsular extraction increased the frequency of complications much more than in the intracapsular operation. The current tests of macular function proved misleading, as an apparently good response often occurred in patients with severe nerve and retinal degeneration, while many patients with a poor response had excellent vision following surgery. In all cases, three corneal scleral sutures were used. The fornix and limbus based conjunctival flaps proved equally satisfactory. Pre-existing glaucoma did not increase the frequency of complications. There was a higher incidence of postoperative hyphema with the keratome-scissors technique than with the Graefe knife section. Diabetic patients showed a relatively higher incidence of secondary glaucoma. Secondary glaucoma occurred in a total of 60 patients, and one-half of these retained useful vision. In patients with high myopia, the incidence of postoperative retinal detachment was relatively higher; other principal causes of retinal detachment were vitreous loss and trauma.

In the eyes that failed to form a chamber because of incomplete closure of the wound, the best results were obtained when the sutures were removed and the wounds cauterized. The injection of air, and posterior sclerotomy gave poor results. The incidence of secondary glaucoma in this group was 14.3 per cent. Iridocyclitis following surgery was a most disturbing complication. In 28 such cases, only 8 secured a visual acuity of 20/70 or better. Secondary membranes occluded the pupil in 89 patients after extracapsular extraction, and 31 of these gained useful vision after discission. JAMES E. LEBENSOHN, M.D.

An Unusual Type of Degenerative Retinopathy. HUGH C. DONAHUE. *Am. J. Ophth.*, 1953, 36: 921.

This interesting case concerns a nurse, aged 52, whose vision had progressively deteriorated in the previous 3 years, and now was reduced to finger counting for each eye. Both fundi showed a similar picture. Between the macula and the disc were large deposits of hyaline and lipoid material in confluent, lobulated masses, and in addition lipoid and hyaline deposits with occasional pigment were scattered through the temporal areas. The left fundus showed a fresh superficial hemorrhage below the macula. Thorough investigation disclosed no evidence of hypertension, arteriosclerosis, diabetes, or renal disease. The only positive findings were obesity and markedly elevated serum cholesterol, and these were consequently assumed to be related to the pathologic process. In cholesterol, it is the higher lipoprotein complexes that are pathologically significant.

A sample of the patient's blood was sent to Gofman who reported that the number of Sf 10–20 molecules was markedly increased. Possibly changes in the vessel walls thus caused a functional narrowing of the retinal arterioles which in turn produced this retinopathy, although ophthalmoscopically no evidence of vascular disease was evident. JAMES E. LEBENSOHN, M.D.

Modification and Defense of the Scleral Implant. W. HEDLEY SUMMERSKILL. *Brit. J. Ophth.*, 1953, 37: 415.

A scleral implant provides the best foundation for a lifelike prosthesis. With changes in technique, and the selection of cases, Summerskill has overcome the objections to this type of operation. Mules' original procedure was discredited because of the incidence of sympathetic ophthalmia, postoperative infection, painful reaction, frequent expulsion of the implant, and occasional bursting of the ball with damage to the orbit. The scleral implant is contraindicated when the eye is required for pathologic examination, when sympathetic ophthalmia is threatened, or malignant disease is suspected, and in severe lacerations of the globe.

Summerskill found that by excising a hole 3 mm. from the sclera, near the termination of the meridional cuts, the postoperative reaction was reduced to negligible proportions. His implant consists of

solid polythene, perforated and guttered to further equalize the intrascleral pressure. He reports consistently excellent results in 20 cases. For immediate implantation the acrylic globes are 12 to 20 mm. in diameter; for delayed implantation after previous evisceration, smaller implants of 8 to 10 mm. diameter must be used. A large Frost implant transmits less movement than a smaller scleral implant since its movements are restricted by inadequate support, by surgery on the extrinsic muscles, and by its tendency to migrate backwards. Moreover the Frost implant requires the larger "reform" prosthesis to fill up the dead space, with a consequent greater inertia of movement than exists with the light "shell" prosthesis over the scleral implant.

JAMES E. LEBENSOHN, M.D.

NOSE AND SINUSES

Osteoma of the Nasal Sinuses (Osteome der Nasennebenhoehlen). F. K. KESSEL. *Helvet. chir. acta*, 1953, 20: 83.

Nine cases of osteoma of the nasal accessory sinuses are reported. Six of these were of the orbitoethmoidal variety and 3 were osteomas of the frontal sinus. In 3 patients with tumors of the orbitoethmoidal type there were present symptoms of intracranial complication (rhinorrhea, pneumatocele, mucocele, meningitis, and brain abscess); in the remaining 3, intracranial involvement was lacking. In the osteomas of the frontal sinus the symptoms were exophthalmos, double vision, ptosis, and protrusion of the glabella.

Eight of these patients were operated upon; the ninth refused operation. There was 1 death; this, however, resulted from erroneous matching of bloods for transfusion.

For the orbitoethmoidal tumors, the usual surgical procedure was a Trotter craniotomy flap with separation of the dura from the orbital roof. Any perforation in the dura was then repaired by fascial flaps and the bone tumor was chiseled loose and removed.

For the frontal sinus osteomas, the incision was made along the course of the coronal sutures, back of the hair line, and the skin and fascial flap were turned down. The frontal sinus (Cushing's method of going through the posterior wall of the frontal sinus was not used) was opened from in front and the tumor was chiseled loose and removed. Such portion of the anterior wall of the sinus as was not destroyed was then replaced; in only one instance was there any notable cosmetic defect. In only one of these patients could a history of injury be elicited.

In the author's opinion, removal of the tumor in uncomplicated cases should be practically without mortality. A chance injury of the dura should be promptly repaired and should be without grave consequences. If the antibiotic therapy is properly applied, the operative prognosis is excellent, even in those instances in which intracranial complications are present. In one case a mucocele had developed which pressed on the optic nerve. The patient recovered perfectly from the operation; however, the vision in the affected eye remained defective.

JOHN W. BRENNAN, M.D.

NECK

Study of the Role of Thyroid Secretion in the Evolution of Cancer by Clinical Documentation (Documents cliniques pour servir a l'etude du role de la sécrétion thyroidienne sur l'évolution du cancer). M. DARGENT and J. LAVIGNE. *Lyon chir.*, 1953, 48: 269.

Observations of 47 cancer carriers who also had a goiter led the authors to the following conclusions:

1. A benign goiter may appear prior to, or concurrently with, a heterotopic malignant growth, especially cancer of the breast or the female reproductive organs. Cervical adenopathies do not necessarily support the diagnosis of cancer of the thyroid gland. All diagnostic methods used to establish the location of the primary tumor should be exhausted before contemplating thyroidectomy in such cases because the removal of the gland may aggravate the cancerous condition.

2. Goiter appearing in a cancer patient, or recurrent goiter developing in such an individual, should be removed only if it creates compression symptoms. If thyroidectomy in such cases is unavoidable, the stimulating effect of pituitary hormones should be counterbalanced by the administration of thyroid hormone.

3. The administration of antithyroid drugs, or x-ray therapy of goiter should not be employed indiscriminately because such therapeutic measures may stimulate cancer growth, may provoke or accelerate malignant degeneration of a benign goiter, or stimulate the growth of a cancer in some other location.

4. The treatment of metastatic thyroid carcinoma with radioiodine accomplishes fixation of the isotope by metastases, but also suppresses the activity of normal thyroid parenchyma which probably has a carcinostatic effect and thus acts like a two-edged sword. The clinical evolution of malignant thyroid tumors supports the authors' hypothesis of carcinostatic secretion of the thyroid gland.

The relatively low malignancy of thyroid cancer in young individuals in the female sex and in patients with hyperthyroidism suggests that the thyroid gland is capable of modifying the evolution of malignant tumors.

JOSEPH K. NARAT, M.D.

Relationship of the Age of the Patient to the Natural History and Prognosis of Carcinoma of the Thyroid. GEORGE CRILE and JOHN B. HAZARD. *Ann. Surg.*, 1953, 138: 33.

The most important clinical feature in separating tumors of the thyroid into two great classes of papillary and nonpapillary carcinomas is the age of the patient. Most cancers of the thyroid in persons under 40 years of age will behave like

papillary carcinomas even if they are predominantly alveolar.

In the classification of cancer of the thyroid, the groups are divided into the papillary and nonpapillary tumors. The malignant papillary neoplasm shows lack of encapsulation of the primary tumor, slow rate of growth, absent or markedly delayed distant metastases, early metastases to the regional lymph nodes, infrequent invasion of blood vessels, and a tendency to occur in young adults and children. In spite of the predominance of alveolar structure in these papillary carcinomas, the clinical behavior will be that of a true papillary tumor rather than the nonpapillary type. Thus a papillary arrangement, even when present in minimal amounts, is a quality which, in thyroid cancer, indicates relatively benign behavior unless it occurs as part of an undifferentiated carcinoma. The malignant nonpapillary neoplasms, with the exception of angioinvasive adenomas, are nonencapsulated, more actively invade perithyroid tissue, tend toward a rapid growth rate, show blood vessel invasion and early distant metastases, and tend to occur in older adults.

In patients under 40 years of age, any cancer of the thyroid is almost certain to be of a relatively low order of malignancy, and regardless of how little papillary configuration it shows, there is about a 95 per cent chance that its clinical behavior will be that of papillary tumor. Conversely, if the patient is over 60 years of age and the tumor is not a clear-cut papillary carcinoma, it is nearly always a highly malignant cancer with a very poor prognosis.

A review of 43 consecutive cases of primary cancer of the thyroid, with personal experience by the author, is presented. The results in this series were regarded as a true reflection of the prognosis of the tumors. Fifteen patients were under 40 years of age at the time of operation, with the exception of one patient who died of carcinoma of the stomach, which was proved at autopsy. In all of these cases the lesions were classified as papillary carcinomas, and none of the patients developed recurrence or metastases from 3 to 15 years after operation.

In a larger series of 105 patients with thyroid carcinoma, seen in the past 5 years, there were 43 patients under 40 years of age. Forty-one of the 43 patients had carcinomas of the papillary type, and 2 had angioinvasive adenomas which were considered to be of low malignancy. The vast majority of cancers of the thyroid in patients under 40 years of age behaved like papillary carcinomas regardless of whether the alveolar or papillary elements predominated. The rare nonpapillary type of cancer that occurs in people under the age of 40 years is usually an angioinvasive adenoma with a low degree of malignancy. The prognosis in this age group is almost uniformly good if an adequate operation is performed. The operation consisted of removal of the entire lobe of the thyroid, usually including the isthmus, part of the other lobe in 10 cases, the entire thyroid in 2 cases, and the major part of both lobes in 3 of the 15 personal cases reported, but the operation did not include removal of the sternomastoid muscle or a conventional radical block dissection. In every instance in which the retrothyroid nodes, the superior mediastinal nodes, and the lateral cervical nodes were involved, they were removed in groups along with the surrounding fat and areolar tissue. In one instance an axillary dissection was included.

In the operative procedure of the nonpapillary group, the angioinvasive adenomas were treated by lobectomy without lymph node dissection.

Adenocarcinoma was treated by lobectomy or thyroidectomy, usually without lymph node dissection, unless the nodes were grossly involved. When the primary operation is incomplete, local recurrence and distant metastases may be common even in papillary tumors. In such cases secondary block dissection may be required, but the authors have not seen distant metastases or inoperable recurrences after operations in which the entire primary tumor was cleanly excised at the first operation.

The prognosis in patients over 60 years of age with cancer of the thyroid was exceedingly poor.

JOHN E. KARABIN, M.D.

Tumors and Hyperplasia of the Parathyroid Glands. LEWIS B. WOOLNER, F. RAYMOND KEATING, JR., and B. MARDEN BLACK. *Cancer*, Philadephia, 1953, 5: 1069.

The pathological findings in the parathyroid glands of 140 patients who had primary hyperparathyroidism are summarized. Data were obtained by surgical removal in 137 cases, and at autopsy in 3 cases. Each classification is carefully discussed and excellent microscopic sections are used for illustration.

In 115 of the 140 cases of primary hyperparathyroidism, a single adenoma was present; multiple adenomas were present in 11 cases, primary water-clear hyperplasia was present in 12 cases, and carcinoma in 2 cases. Single hyperfunctioning adenomas in this series varied in size from 101 gm. to approximately 25 mgm. Some gross relationship was evident between the size of the adenomas and the degree of hyperfunction.

Histologically, adenomas may be composed of small or large chief cells, transitional water-clear cells, wasserhelle cells, or oxyphil cells. Approximately two-thirds of the adenomas could be classified according to a dominant cellular type whereas the remainder showed mixtures of several, or all, types of cells. The chief cell adenoma was the commonest type.

Five single wasserhelle adenomas were noted. These may be confused histologically with primary water-clear hyperplasia. Three hyperfunctioning adenomas were composed almost entirely of pale oxyphil cells. Fourteen well encapsulated adenomas

displayed great cytological irregularity and contained many giant nuclei. These were benign clinically. Five cases of primary hyperparathyroidism were associated with hypoglycemia, and there was a proved tumor of the pituitary gland in 3 of these cases. In this syndrome, involvement of multiple parathyroid glands was a constant finding. The changes in the parathyroids in certain of these cases suggested a primary nodular hyperplasia rather than formation of a true tumor. In 12 cases of primary water-clear hyperplasia, the weight of hyperplastic parathyroid tissue removed surgically varied from 52.5 gm. to 760 gm. Two, three, four, or more masses of parathyroid tissue may be found in the neck.

The histological picture in most cases of primary hyperplasia is uniform throughout, only large water-clear cells being present. In exceptional cases an admixture of smaller clear cells or a few chief cells may be found. Histologically, primary hyperplasia may be separated readily from secondary hyperplasia of the parathyroids.

Carcinoma of the parathyroids is rare. In one case in this series, recurrence and metastasis occurred. The tumor in the second case was classified as carcinoma on the basis of invasion of adjacent structures. No recurrences or metastases have taken place up to the time of this report.

ERNEST D. BLOOMENTHAL, M.D.

Bilateral Polypoid Granuloma of the Larynx Following Endotracheal Anesthesia. D. IOANNOVICH. *Arch. Otolar.*, 1953, 57: 31.

Precautions should be taken to avoid injuries during endotracheal anesthesia. At present such injuries are rare, but they may be encountered more frequently in the future, owing to the increasing use of this kind of anesthesia.

Before inducing endotracheal anesthesia, it is wise to examine the patient by indirect laryngoscopy, as is recommended before direct laryngoscopy and tracheobronchoscopy. Chronic inflammations of the larynx, favoring the development of similar changes after the anesthesia, are a temporary contraindication.

It is equally wise to introduce the endotracheal catheter by direct laryngoscopy rather than blindly, and when the vocal cords are in perfect abduction, as it is well known that the barbiturates, intravenously administered, give rise to laryngospasm. To avoid spasm, experienced laryngologists recommend surface anesthesia with a spray of 2 per cent tetracaine hydrochloride.

After endotracheal anesthesia the larynx must be examined, and the patient is instructed to avoid coughing, intense phonation, and frequent speech. The number of published cases of injury following endotracheal anesthesia is small (about 30) as against many thousands of cases in which endotracheal anesthesia has been used.

W. FOSTER MONTGOMERY, M.D.

Primary Tracheal Tumors in the Infant and in the Adult. JOSEPH G. GILBERT, LAWRENCE A. MAZZARELLA, and LOUIS J. FEIT. *Arch. Otolar.*, 1953, 57: 1.

Primary tracheal tumors in infants and children are of rather infrequent occurrence. Only 43 cases have been reported in the literature. Data on a total of 503 tumors in adults have been compiled. In children, approximately 93 per cent of the tumors were benign, whereas in the adult approximately 50 per cent were malignant. In the infant, the predominant malignant tumor was the sarcoma; in fact, this was the only type of malignancy reported and, strangely enough, it was present only in girls. In the adult, carcinoma (almost 80%) is the predominant form of malignancy. The predominant benign tumors of childhood in the order of their frequency are the papilloma, fibroma, and angioma; those of the adult are the osteochondroma, papilloma, and fibroma.

W. FOSTER MONTGOMERY, M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Management of Intracranial Arterial Aneurysms. HOMER D. KIRGIS and DEAN H. ECHOLS. *Surg. Clin. N. America*, 1953, 33: 1003.

The symptoms and signs associated with intracranial arterial aneurysms are outlined in some detail. The differentiation between subarachnoid hemorrhage and intracerebral hemorrhage is also discussed, and the differential diagnosis is described.

Spinal puncture reveals bloody fluid in a high percentage of cases, but this may result from conditions aside from a ruptured intracranial aneurysm.

Subhyaloid hemorrhages are considered pathognomonic of bleeding into the subarachnoid space.

X-ray films may show some erosion of the skull, or evidence of calcification within the aneurysm. The pineal gland may show a shift with an intracerebral hemorrhage resulting from a ruptured aneurysm.

The role of angiography in the diagnosis of intracranial vascular lesions and the technical approach to this procedure are described in some detail.

Treatment may be conservative, with rest, supportive measures, and spinal puncture.

Ligation or occlusion of the common carotid or internal carotid has been used with more success in the infraclinoid type of internal carotid aneurysm than in those more distal. Gradual occlusion with the White-Silverstone clamp has been of considerable value in the treatment of the infraclinoid type. If symptoms are not alleviated by these measures the pressure within the aneurysm can be further reduced by occlusion of the ophthalmic artery and the internal carotid artery distal to the aneurysm through an intracranial approach.

The direct surgical approach to intracranial aneurysms can be carried out with success in certain types, particularly (1) pedunculated aneurysms which may be removed, if accessible, following the application of a clip or ligature upon the neck of the aneurysm, (2) small sacculated aneurysms which may be obliterated by the use of a series of clips, and (3) aneurysms located so that the segment of vessel from which it arises may be ligated proximal and distal to the lesion with or without actual removal of the aneurysm.

The more detailed surgical approach to specific aneurysmal problems about the circle of Willis is described and illustrated in some detail.

The necessary precautions in the intracranial surgical treatment of aneurysms are described, particularly with reference to preparations for rapid aspirations of blood to keep the operative field clear.

Adequate exposure is most important and, more recently, some help has been obtained from controlled arterial hypertension during the course of the operative procedure. HOWARD A. BROWN, M.D.

Diagnosis and Surgical Treatment of Cerebral and Meningeal Tuberculosis (Beitrag zur Klinik und chirurgischen Behandlung der Gehirn- und Meningealtuberkulose). F. PAMPUS. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1953, 274: 470.

The author gives a didactic lecture on the tuberculous lesions of the central nervous system from the views of pathological anatomy, clinical findings, and treatment. He describes acute and chronic leptomeningitis, tuberculous meningitis, tuberculous serous meningitis, tuberculous circumscript meningitis, tuberculous pachymeningitis, the solitary tubercle, the conglomeration tubercle, and the tuberculoma. He then discusses the operative technique, operative indications, and prognosis.

The patients are given 1 gm. of streptomycin intramuscularly for 2 or 3 days before operation. After operation they are given 2 gm. a day intramuscularly. They also receive first 100 and later 50 mgm. a day of streptomycin intrathecally. After 10 days they receive only 2 to 3 intrathecal injections a week for another 3 to 4 weeks. The parenteral injection of streptomycin is given for a period of several months and the amount depends upon the general condition.

The author then gives 6 case histories. The first patient was treated conservatively with streptomycin for a tuberculous serous meningitis with complete recovery. The second patient was operated upon for a left frontal subarachnoidal cyst, which was thought to be the result of a tuberculous cystic arachnoiditis, with complete recovery. The third patient, who had a 5 year history of Jacksonian convulsions and hemiparesis was operated upon and a tuberculous circumscript meningitis was found. However, following operation he developed an active tuberculous meningitis and died. In the fourth case a fairly large, solitary tuberculoma was removed from the right temporal lobe and at the same time the optic nerves were freed from a tuberculous chiasmatic arachnoiditis. In the fifth case, a tuberculoma was removed from the roof of the fourth ventricle and a ventriculocisternostomy was performed because of suspicion of the presence of another possible tuberculoma. The patient died later of a tuberculoma in the pons. The sixth patient had arachnoiditis of the chiasm with bilateral papilledema. He was operated upon and his condition improved. In the last 2 cases, streptomycin together with para-aminosalicylic acid therapy was used. GEORGE PERRET, M.D.

Hazards of Lobotomy. Study of 2000 Operations. WALTER FREEMAN. *J. Am. M. Ass.*, 1953, 152: 487.

The author presents his personal experience in conjunction with J. W. Watts and J. M. Williams over the 16 year period from 1936 to 1952. It is a statistical analysis and covers a review of 1,863 patients who had undergone a total of 2,005 operations. Six hundred and twenty-four patients underwent pre-

frontal lobotomy and 1,239 underwent transorbital lobotomy. Of the patients treated by prefrontal lobotomy, only 2 were lost to follow-up during the 3 years following operation. The first 500 patients who had undergone transorbital lobotomy were followed for at least 2 years, and another 200 patients were followed for 1 year.

There were 24 deaths among the patients who had had prefrontal lobotomy, an incidence of 3.6 per cent. There were 20 deaths among the transorbital group, an incidence of 1.7 per cent. Hemorrhage, misdirected incision, shock, and/or hyperthermia and infection were responsible for the deaths in the prefrontal lobotomy group, and hemorrhage was responsible for the greatest number of deaths of the transorbital lobotomy group. The incidence of hemorrhage was twice as great among the transorbital lobotomy cases as among the prefrontal lobotomy cases, while other complications observed in the prefrontal lobotomy cases were of only minor significance in the transorbital group.

Nonoperative fatalities are listed for both groups. There were 61 nonoperative deaths (10%) in the prefrontal lobotomy series; most of these were due to heart disease. Nonoperative fatalities among transorbital lobotomy cases included 49 deaths, or 4 per cent of the total group. The greatest cause of death in this latter group was malignant disease. A slightly higher incidence of death from malignant disease in the transorbital lobotomy series, according to the author, reflected the more frequent performance of this operation in relieving the pain and stress of patients with terminal carcinoma. He believed that major lobotomy was unnecessarily drastic for such cases.

Convulsions occurred in 25 per cent of the patients with prefrontal lobotomy as compared with 1.6 per cent of those with transorbital lobotomy; however, the period of postoperative observation of the transorbital group is shorter than that of the prefrontal group. A statement as to whether the patients were chosen for each operation by different criteria is not given. Urinary incontinence for more than a month was present in 20 per cent of the patients who had undergone prefrontal lobotomy, and in only 2.5 per cent of the transorbital group. Persistent urinary incontinence was observed in 7 per cent of the prefrontal group as compared with 0.7 per cent of the transorbital group.

Thus, in a statistical analysis, hemorrhage with paralysis occurred in 1.4 per cent of the prefrontal group and in 0.6 per cent of the transorbital group; incontinence occurred in 24 per cent of the prefrontal, and in 2.5 per cent of the transorbital group, and convulsions occurred in 25.6 per cent of the prefrontal as opposed to 1.6 per cent of the transorbital group. The breaking of an instrument occurred in 0.3 per cent of both groups, and cerebrospinal rhinorrhea occurred in 0.2 per cent of the transorbital group.

The "frontal lobe syndrome" occurred with sufficient prominence to be a disturbing factor in social adjustment in 9.3 per cent of the prefrontal group and in 0.5 per cent of the transorbital group. Inadequate social adjustment directly attributable to lobotomy occurred in 56 patients of the prefrontal lobotomy series and in 6 of the transorbital lobotomy series.

Social complications were recorded, showing the occurrence of: the frontal lobe syndrome in 9.3 per cent of the prefrontal group versus 0.5 per cent of the transorbital group; obesity, in 22.7 per cent of the prefrontal group versus 1.5 per cent of the transorbital group; alcoholism, 1.0 per cent versus 0.6 per cent; illegitimate pregnancy, 0.7 per cent versus 0.4 per cent; and homicide, 0.1 per cent only in the prefrontal group. Thus, the total analysis demonstrated that 33.8 per cent of the prefrontal lobotomy patients had social complications and sequelae of significance as compared to only 3 per cent of the transorbital group.

The author does not analyze the two groups with respect to the effects upon the diseases for which the procedures were done.

The need for early treatment in mental disease and the hazards of delay are emphasized, inasmuch as the chances are only approximately one in ten for a patient with chronic mental illness to return to some useful work outside the hospital. If the postoperative results are correlated with the total duration of hospitalization before lobotomy, it is evident that the better results occur in those cases which have been surgically treated within shorter periods of hospitalization.

The author concludes by indicating that, because of the high incidence of fatalities and complications following prefrontal lobotomy, this procedure has been almost abandoned in the last 3 years, and transorbital lobotomy has become the method of choice.

W. EUGENE STERN, M.D.

Meningiomas of the Base of the Cranium (Meningiomi della base cranica). C. AMBROSETTO and M. QUARTI. *Chirurgia*, 1952, 7: 1, 54.

The authors present an excellent collective review of the subject of meningiomas as discussed at the Eleventh Congress of the Italian Neurological Society, in Naples. The subject is an important one since tumors originating from the meninges constitute approximately 16.6 per cent of all endocranial neoplasms. They are usually of a benign nature and are adherent only to the dura mater or the cranial bones.

The first successful removal of an endocranial tumor, according to the authors, was by Durante in 1885. This was apparently a meningioma. Cushing (1922) is credited with the clarification of terminology and was first to use the term "meningioma." His monograph constitutes the basic fundamentals of our knowledge of meningiomas.

Meningiomas of the anterior cranial fossa include those in the region of the lamina cribrosa. Symptoms of tumors in this location consist of disturbances of smell, vision, and psychic aberrations. If a patient has other signs of a cerebral tumor, and

anosmia represents an initial symptom, one can usually conclude that in all probability he has a meningioma of the olfactory area. With diminution of visual acuity, the patient develops a central scotoma, which tends to differentiate the condition from a retrobulbar neuritis. Psychic disturbances may be characterized by confusion, depression, and pseudoparalysis. The accessory symptoms are related alterations in muscular tone and disturbances in equilibrium. The hypophysial symptoms include somnolence, polydipsia, obesity, and sensory dysfunctions. These meningiomas may appear roentgenologically as true osteomas of the ethmoid bone. Differential diagnosis in this area includes glioma, tumors of the corpus callosum, chronic abscess with deposition of calcium, and other hypophysial tumors. In 25 per cent of the authors' cases the initial symptom of olfactory disturbance was present. Six per cent had no history of olfactory disturbance. Alteration in vision was present in 30 per cent of the cases and the Foster-Kennedy syndrome in 16 per cent of cases; psychic alterations were present in 70 per cent. An area of circumscribed hyperostoses in the anterior cranial fossa in the case of brain tumor may aid indirectly in the diagnosis of meningioma.

Meningiomas of the optic nerve arise as extensions from the lesser wing of the sphenoid or from the hypophyseal area. These may invade the optic canal with involvement of the optic nerve. Involvement of the superior orbital fissure is not unusual. Symptoms in this area are unilateral diminution of visual acuity, palpebral chemosis, exophthalmos, pseudovisual hallucinations, and reduction and irregularity of the visual fields. Differential diagnosis is based chiefly on radiologic findings together with the clinical history.

Meningiomas at the base of the middle fossa occur at the optic chiasma, the greater and lesser wings of the sphenoid, the infratemporal fossa, and at Meckel's cave.

Suprasellar or chiasmatic meningiomas may produce optic atrophy with hemianopsia with a normal appearing sella. The symptomatology may reveal disturbances of vision. Symptoms may be referable to involvement of neighboring structures or they may remain asymptomatic. The fundus may show signs of optic atrophy or the Foster-Kennedy syndrome may make it's appearance. Hypophyseal, olfactory, or third nerve involvement may appear with an increase in intracranial pressure. In the authors' cases disturbances of vision, exophthalmos, paresthesias, coma, adiposity, polyuria, and somnolence predominated.

Meningiomas of the sphenoidal area represent the highest percentage of meningiomas at the base of the skull (38.2%). These may be subdivided into those arising from the internal clinoidal portion, the medial alar portion, and the external pterion portion. In the clinoidal group the syndrome includes unilateral optic atrophy, exophthalmos, and photophobia. The Foster-Kennedy syndrome and oculomotor disturbances are seen along with personality changes, convulsions, and psychomotor changes. In the alar group the meningiomas may remain asymptomatic for a long period of time and may not be accompanied by signs of rising intracranial pressure. Visual and psychic changes may occur.

Infratemporal meningiomas are usually diagnosed with the aid of arteriography and electroencephalography. These tumors develop in the temporal fossa and the symptomatology is quite similar to that in cases of tumors of the temporal lobe.

Meningiomas of the posterior fossa represent 9 per cent of all meningiomas in general, and 19.4 per cent of basilar meningiomas. Further subdivisions are: basilar, 10 per cent; foramen magnum, 5 per cent; pontocerebellar angle, 50 per cent; tentorial lateral recess, 25 per cent; other locations, 10 per cent. Difficulties in diagnosis are discussed and the importance of differential diagnosis is emphasized. Meningiomas of the clivus of the sphenoid are discussed. The points are emphasized by numerous case reports.

In the final analysis the success of the treatment of meningiomas depends upon operative intervention. The gross subdivision of meningiomas falls into two categories: those of the cranial vault and those of the cranial base. The former are more easily accessible without the great risk to life that the latter entails. Precise radiologic pin-pointing of minute details is of utmost importance. The extension and configuration of the neoplastic mass, and the nature of vascularization is important.

The work of Cushing and of Fasiani is referred to frequently. The parallel between the two is considered significant.

In the second part of the article, the surgical management of the various lesions is considered in detail. FRANK W. PIRRUCCELLO, M.D.

SPINAL CORD AND ITS COVERINGS

The Treatment of Traumatic Paraplegia in Fractures of the Lumbodorsal Spine. IAN LAWSON DICK. *Edinburgh M. J.*, 1953, 60: 249.

The thoracolumbar junction is the most common site of fracture and fracture dislocation in the thoracic and lumbar spine. Injury in this area is followed by a combination of cord damage and nerve root damage involving the cauda equina. Should an injury in such a location be associated with total paralysis below the site of lesion, it must not be overlooked that part of this injury may be due to involvement of roots of the cauda equina and, therefore, being a peripheral type lesion, may show recovery in time.

Treatment of the orthopedic lesion. The displacement in the case of thoracolumbar fracture should be reduced as soon as possible to relieve any continuing injury to nerve roots which have not been destroyed, and the spine should be immobilized. Gentle extension of the spine may be achieved by the simple maneuver of turning the patient onto his face in bed. If the displacement is more severe and if the

articulating processes are locked, open operation may be the only safe way by which satisfactory reduction may be secured. Manipulation is dangerous. The maintenance of the reduced position should not be attempted by the use of plaster beds. Spinal extension may be maintained by meticulous nursing care and careful turning of the patient. However, such a nonoperative method is open to the criticism that an undue responsibility is placed upon the nursing staff to insure that the patient is not moved improperly, and, secondly, that some unavoidable movement at the site of injury, which may be necessary for ordinary routine nursing, may cause further root damage. Although the bony configuration may be normal and although the roentgenogram may not show any evidence of severe fracture, the spine may be quite unstable because of the injury to ligaments and other posterior soft tissues. The telltale triangular fragment detached from the upper anterior corner of the vertebral body is an important sign, usually associated with some widening of the interval between the spinous processes. The author recommends that in such cases a plate or pair of plates may be bolted to the spinous processes, which may secure the spine sufficiently well that no danger of further damage is present during ordinary nursing handling. The author does not explore the role of laminectomy in detail.

Care of the bladder. The five methods available for bladder drainage are manual expression, intermittent catheterization, indwelling urethral catheter, suprapubic cystostomy, and suprapubic aspiration of the bladder—an emergency measure.

If the bladder is allowed to fill it may be evacuated by gentle manual pressure. Only gentle pressure is permissible to overcome the objection of the danger of rupture of the bladder. If gentle manual expression fails a urethral catheter should be passed. The author describes in meticulous detail the scrupulous care needed in the aseptic performance of this procedure by an experienced surgeon.

If intermittent catheterization is continued for more than a week, a retention catheter is recommended. Tidal drainage is not considered safe until the bladder has regained its muscle tone. If the sacral reflexes are present an automatic or cord bladder is likely to develop. The patient is to be encouraged in cultivating a trigger stimulus for bladder evacuation. If the sacral reflexes are absent an autonomic bladder is to be expected.

Suprapubic cystostomy is not recommended except as an emergency measure. Suprapubic aspiration of the bladder may be relatively safe and is considered safer than the performance of transurethral catheterization under bad conditions.

Care of the skin. An avascular necrosis of the skin and underlying tissue will develop in a short time. Weight bearing must not be permitted on any part of the body for more than 2 hours. The satisfactory treatment of the decubitus lesion includes the control of intercurrent infections, the combating of secondary anemias, the maintenance of satisfactory hemoglobin levels, and meticulous nursing care. The patient will remain permanently responsible for his own skin hygiene.

Management of the bowels. An occasional ileus may develop as the result of a retroperitoneal hematoma associated with the vertebral fracture. A regular bowel routine is recommended, for the autonomic nerve supply to the upper colon is usually above the thoracolumbar juncture and satisfactory bowel evacuation is usually possible. The early use of the bedpan may start skin breakdown.

Rehabilitation and ambulation. The development of the trunk musculature is of paramount importance. Balance may be difficult and the patient should learn to sit in front of a mirror. His legs will need stabilization, and when he can stand he may progress to parallel bar-walking and then to crutch-walking with a "tripod" gait. Competitive games are most essential. Archery stands high among these games, together with wheel-chair basketball, javelin throwing, etc.

The paraplegic is prone to recurrent infection and as a result trouble with the bladder or skin may occur as a secondary change. He cannot afford to be even momentarily careless and he should be a teetotaler. General attention to matters of hygiene and health are essential, and the patient with a fever should be treated in a paraplegic unit.

The management of urinary complications, decubitus ulcers, contractures and spasms, and phantom limb syndromes constitute special problems. The distressing type of ossification about the joints of the extremities may require special procedures. Adductor spasms may be controlled by obturator neurectomy. Strong flexor spasms may only be controlled by the intrathecal injection of alcohol. The use of 8 to 10 cubic centimeters of alcohol is recommended, injected between the twelfth thoracic and the first lumbar interspace, with the patient in the head down position. Such alcohol injections, of course, may alter the bladder function and the patient may have to be retrained. Sexual potency is also lost with these injections.

The care of the paraplegic patient requires the knowledge of many specialties and the aim of treatment is prevention rather than cure.

W. EUGENE STERN, M.D.

Chordomas. A Review of 19 Cases of Chordomas, Including 5 Vertebral Cases. JOHN H. W. BIRRELL. *Austral. N. Zealand J. Surg.*, 1953, 22: 258.

This presentation from the Department of Pathology of the University of Melbourne covers material from Australia in a specified vicinity over 25 years. A brief historical review is followed by a discussion of the embryology of the notochord. The histogenesis of chordomas remains in question. There is no doubt that these tumors occur in the region of the course originally taken by the fetal notochord but it does not appear to the author necessary to postulate an origin from specific cells in the case of these tumors. Thus, one might expect the proliferating

tissue in the vertebral region to differentiate in the direction of a mucoid tissue resembling the notochord, such as is seen in the cells of the annulus fibrosis. Such metaplasia of connective tissue is often morphologically indistinguishable from typical physaliferous cells.

Chordomas structurally resemble notochordal tissue and, though they may conceivably have arisen from true notochordal remnants, they are even more likely to have developed by processes of differentiation from any of the tissues which replace the notochord. The tumors may be present in the cranium or in the region of the sphenoid bone, the clivus, and nasopharynx. They may be present in the vertebral region or sacrococcygeal region. In the latter they may occur anterior to, within, or posterior to the sacrum.

By the end of 1950, 284 chordomas had been recorded in the literature. Of these, 105 were in the cranial cavity, 36 were vertebral in location, and 143 were sacrococcygeal. Of the author's own series, 1 was intracranial, 5 were vertebral, and 13 were sacrococcygeal. No age group was excepted or exempt. The tumors, when seen at operation or at autopsy, were usually spherical in shape, variegated in color, firm in consistency, and apparently encapsulated. Invasion is often obvious. An important feature is the destruction of bone which the tumor replaces.

The illustrations of histology of these tumors would bear scrutiny by those interested. The appearance of these lesions varies in all gradations from a very cellular hyperplastic tissue to tissues laden with mucin. The amount of mucin varies with the length of the life history of the cell. First, it is present in minute droplets, which grow and eventually break out of the cell, appearing outside the cell membrane and forming a characteristic intercellular accumulation. Thus the "bubble" or bladderlike appearance, which is so characteristic of these tumors, is evident. The diagnostic feature of these tumors is the presence of both intracellular and extracellular mucin. The x-ray changes present include expansion of the tumor mass, rarefaction and destruction, and trabeculation of undestroyed bone which may extend into the soft tissues outside the original boundary of the bone. The symptomatology is not characteristic and pain is the most common finding. Headache is a constant concomitant among the intracranial tumors at some stage of the disease. In the vertebral cases, pain, which is followed sooner or later by paralysis, may be evident. In the sacrococcygeal cases, pain is the universal symptom present and may be associated with a visible mass. The diagnosis ultimately rests upon the histologic examination and the finding of the typical physaliferous cells.

The treatment, insofar as cranial and vertebral cases are concerned, carries a hopeless prognosis but if surgical removal is at all feasible, operation is the only hope of cure. The value of deep x-ray therapy is difficult to assess. It may alleviate pain. It is therefore worthwhile even in advanced cases. These tumors do metastasize, although no such metastases were found in the present series.

W. EUGENE STERN, M.D.

PERIPHERAL NERVES

Twenty-Five Operated Cases of Intrathoracic Nerve Tumors. E. HUSFELDT and M. GERNER-SMIDT. *Acta chir. scand.*, 1953, 104: 285.

The authors, from the Department of Surgery of the University of Copenhagen, review 25 cases of this disease occurring from the years 1945 to 1952. The commonest of these intrathoracic neurogenic tumors are nerve sheath tumors. A neurinoma is a benign tumor which consists mainly of neuromatous tissue dispersed in a stroma of connective tissue. The presence of connective tissue is regarded as a sign of regeneration in a tumor which shows a tendency to degeneration corresponding to the characteristic arrangement of the vessels. The term, perineural fibroma, indicates a tumor of which the connective tissue is the active part of the lesion, and is regarded by the authors as a true fibroma with the possibility of being malignant.

The malignant nerve sheath tumor is given the name, neurogenic sarcoma. The benign sympathetic nerve tumor is given the name, ganglioneuroma, and the malignant sympathetic nerve tumor is called a sympathoblastoma.

The neurinoma is a soft lobulated grayish-red tumor of varying size surrounded by a capsule. The perineural fibromas are paler, more solid and fibrotic, and more homogeneous in character. It is often impossible to distinguish them from malignant forms. The growth of these tumors usually is slow and noninfiltrating but, when of sufficient size, they may push aside surrounding tissues, erode ribs, and vertebrae. The ganglioneuroma may resemble a fibromyoma and may grow to considerable size. It is a shiny, pale, yellowish red and shows partial lobulation.

The malignant tumors are soft and vascular and metastasize early. Both the ganglioneuroma and nerve sheath tumors can take the form of an hour glass tumor with a prolongation through the intervertebral foramen. The benign nerve sheath tumors occur at all ages. The ganglioneuromas may occur at any time from the first year of age up to 40 years. The malignant sympathetic tumors in the chest are found only in children.

Although the tumors are usually situated in the costovertebral groove there is no definite syndrome associated with these lesions, for the surrounding structures are usually pushed aside. Pressure upon surrounding nerves may produce pain radiating into the neck, shoulder, arms, rib, and abdomen. Pain is the commonest symptom but it is far from constant and was present in 13 patients of the present series. Its localization gave no index to the situation of the tumor apart from indicating

the side of the chest involved, and there was no relationship between the degree of pain and the size of the tumor.

Upon clinical examination little information is obtained. Dullness and impaired thoracic movement was noted in 7 cases. Six of the 25 cases had an intravertebral extension of the tumor but in none of these was there any reason to suspect this preoperatively. Involvement of the spinal canal may produce characteristic symptoms of an extramedullary tumor, and, if untreated, paralysis of the lower extremities may develop within 1 to 2 years. These authors believe that, on the whole, 10 to 15 per cent of intrathoracic nerve tumors will be complicated by symptomless extramedullary extension and about 1 to 2 per cent of such tumors will give rise to symptoms of intravertebral involvement.

X-ray examination of the chest, revealing a well defined homogeneous shadow in the upper thoracic region, is highly suggestive of a nerve tumor. If the tumor is situated in another location in the chest, a definite radiologic diagnosis is not possible. Patients with dumbbell tumors will show erosion of the intervertebral foramen and should have a myelogram performed.

The treatment for these lesions is surgery. The tendency to malignant change in the lesions is from 5 to 15 per cent. The authors believe that all cases of such tumors discovered in childhood should be operated upon without delay because of the chance of malignancy being much greater at this age. They likewise believe that all tumors which produce symptoms should be operated upon. All patients with a prolongation of the tumor mass into the intervertebral or spinal canal should be operated upon. The authors are agreed that dumbbell tumors should be approached by laminectomy initially. The thoracic approach to these lesions may subsequently be followed by a Horner's syndrome, but otherwise there are no serious complications.

All 25 of the authors' patients were operated upon and the average period of follow-up observation has been 3 years. Of the series of 25 tumors, 24 were clinically and histologically benign. One patient had a neurogenic sarcoma and died 2 years following operation, presumably from metastases of the brain. The remaining 24 patients were alive without signs of recurrence. One patient had paralysis of the lower extremities as a postoperative complication. Sixteen patients were well and 7 had minor complaints. W. EUGENE STERN, M.D.

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Actual Problems of Management of Carcinoma of the Breast (Aktuelle Probleme der Behandlung des Mamma-Karzinoms). R. WANKE. *Deut. med. Wschr.*, 1953, 78: 727.

The author discusses the accepted treatment for breast cancer, emphasizing that in many places there is neglect of treatment by radiation and only radical surgery is employed.

He divides the cases into 3 groups: group I in which radical surgery is the treatment of choice and radiation is advisable, group II in which radiation is essential, and group III in which it replaces (in most cases) radical surgery. In the latter group life can be temporarily prolonged only by means of radiation. Since the German statistics regarding radiation are 30 years old and the accepted survival period is 5 years, there is ample experience with this method.

Table I in the original article shows that cases given combined management present results from 15 to 20 per cent better than those given radical surgical treatment alone. Table II compares the statistics from Kiel with those of Anglo-American authors.

To obtain a fair picture, cases which were not given treatment at all must also be considered. According to Daland, after 3 years 40 per cent, after 5 years 22 per cent, and after 10 years 5 per cent of the patients survive. Park-Lees gives similar numbers. Specific questions are discussed under separate headings.

THE DEGREE OF OPERATIVE PROCEDURE

Is there a possibility or a necessity to broaden today's accepted operative procedures? Yes. When following up cases after operation, one sometimes sees a new spread of disease. It is usually parasternal, and it spreads through the lymphatics in the retrocostal region and parasternally on the pleura. The importance of these routes was emphasized as early as 1888, but it was not until after the second World War that they were evaluated from the clinical point of view in breast cancer. So far the clinical findings regarding the localization of the primary site, whether medial, lateral, cranial, or caudal, do not show any conclusive relationship to the spread to the lymph nodes of the breast. Medial localization, however, occurs more often (30%) than lateral (12%). The author's experience is limited, but on computing several statistics (a total of 318 cases) he shows 56 per cent of axillary and 26 per cent of mammary involvement.

It was also seen in Stage I that the mammary lymph nodes were affected. Therefore, the radical surgery must include not only the axillary and infraclavicular nodes but also the parasternal. Cartilages of the second and third ribs must be resected and the intercostal muscles in the first 3 interspaces cut out. According to the author's experience, this has to be done also in stage I as long as the patient is able to stand the operation. To gain access to the supraclavicular and deep-lying nodes, the clavicle should be cut, the first rib resected, and the sternum split (Wangensteen). This is stage II. By such a procedure, of course, the operative risk increases substantially. Here arises the question of whether radiation is not more helpful. Sauerbruch gave up such overradical surgery 25 years ago.

RADIATION TREATMENT

There is a possibility that the long-lasting results of radiation therapy are enhanced by changing and improving the methods of radiation. Juengling, in Germany, found that about two-thirds of all cases show regression of swelling and size after x-ray therapy and one-third remains unchanged. The first conclusion is that radiation should be done in all cases which are in such a late stage that all surgery is excluded. This way it is possible to make some of the lesions regress so far that they will be operable. This opens a question of routine preoperative as well as postoperative radiation. According to earlier Kiel statistics, postoperative radiation improved the operative results. As to the dose of radiation, earlier doses were usually 1,000 roentgens for a field. This recently was increased to 3,000 roentgens per field. However, according to microscopic examinations of resected tissues (Haagenson), cancer cells are always found in all cases. Therefore, radiation serves only as a devitalization of the cancer tissues (Kohler *et al.*). Sometimes it is possible to change the dose of radiation because of a different location or swelling. Also, sensitivity to the rays plays its role; therefore, sometimes postoperative radiation is not necessary. The operation is performed 6 to 8 weeks after the end of radiation. The loss of time might enhance the metastases, but this is negligible when the maximum possible dose is used. Also the reaction of the tissues to radiation by this time is gone, and there is no impairment to the healing of the tissues. The biggest danger is the reluctance of the patient to undergo surgery after improvement by postradiation.

HORMONE TREATMENT

Years ago there was this conception: a different course of breast cancer existed in women in the reproductive age compared to those past the menopause, in spite of the fact that the management was the same. Newer extensive statistics (Nohrman), however, showed that 5 year cures occurred in about the same incidence in both groups. The prognosis between the ages 35 and 70 years is about the same. Later it is worse on account of old age. During pregnancy the diagnosis is usually made later because of the larger size of the breast during this period. This is the most important reason for a

worse prognosis in pregnancy. The group of women in pregnancy who previously underwent radical breast surgery is too small to permit any statistical conclusions. As to the influence of the follicular hormone on cancer of the breast, experience shows that women who have had children are less apt to get cancer of the breast than nulliparas. According to different statistics, between 59.2 and 81.8 per cent of women having breast cancer are nulliparas.

Different hormonal cures have been tried: male hormones, female hormones, and castration (surgical or by radiation). Operative castration in recurrent metastatic cancers gave good results according to various authors. Treatment with male hormones: the inoperable third stage of cancer is treated with high doses of testosterone (up to 100 mgm. a day). This must be continued for at least 3 months without interruption before the dose can be decreased. There was one outstanding case of stage 3 cancer with bony metastases. The woman lived for 2 more years without any pain or difficulty, but treatment is always only a temporary palliative measure. The average survival is 10 months, but the general state of the patients improves as well as their blood count and sedimentation rate, and about 75 per cent of them gain weight. Recalcification of bony metastases occurs in up to 20 per cent of the cases.

Recently a new preparation (notandron) was introduced. It has only 2½ per cent of the androgen content of testosterone. It does not cause the disagreeable virilization in the sense of the Cushing syndrome as seen with testosterone.

MARIANO LÓPEZ-BELÍO, M.D.

Sarcomas of the Breast (Contribution à l'étude des sarcomas mammaires). ELIE MONNOYER. *Acta chir. belg.*, 1953, 52: 339.

The author presents a clinical study of sarcomas of the breast observed at the Cancer Center of the University of Liege during the period from 1925 through 1952. The 9 patients with breast sarcoma seen during that interval represent 0.47 per cent of all breast malignancies recorded during that period.

Of the 9 lesions, 3 were fibrosarcomas, 1 was a lipomyxosarcoma, 1 a chondrosarcoma, 1 a reticuloendothelioma, 1 a lymphosarcoma, 1 a polymorphic sarcoma, and 1 a melanosarcoma. It is interesting to note that in 1 instance, a breast sarcoma developed 7 years after a carcinoma of the opposite breast had been diagnosed and treated.

Sarcomas of the breast are characterized by rather slow growth and only infrequently involve the local lymph nodes. It seems apparent that the primary spread of such lesions is blood borne. In several of the author's series, repeated local excisions of recurrent sarcomas were accomplished over a period of years. The prognosis of mammary sarcomas seems to be good for the fibrosarcomas and the lipomyxosarcomas. The author believes that the prognosis is not so favorable for the other forms. In this series, 5 patients survived for 5 years or longer, 2 died of unrelated causes, and 2 died from effects of the sarcoma.

The author believes that the ideal treatment for breast sarcoma is radical mastectomy followed by complementary radiotherapy. In a recent American report it has been suggested that radical surgery of the breast without complementary x-ray therapy is ample treatment for these lesions.

ORVILLE F. GRIMES, M.D.

Fibroadenoma and Cystosarcoma Phylloid of the Breast (Fibroadenoma e cistosarcoma filloide della mammella). UGO NARDUCCI and FRANCESCO SQUARTINI. *Lav. ist. anat. Univ. Perugia*, 1952, 12: Supp. 1.

In order to determine the morphological and genetic relationships between cystosarcoma and fibroadenoma, the authors studied 402 cases of fibroepithelial tumors of the female breast histopathologically and statistically, and classified them as follows:

1. Pure intracanalicular fibroadenoma (53 cases: 13.18%).
2. Intracanalicular fibroadenoma with cystosarcomatous aspects (18 cases: 4.47%).
3. Phylloid cystosarcoma (20 cases: 4.97%).
4. Mixed forms, intracanalicular and pericanalicular (64 cases: 15.92%).
5. Pure pericanalicular fibroadenoma (204 cases: 50.74%).
6. Adenosarcoma (1 case: 0.25%).
7. Fibroepithelial tumor without clearly definite characteristics (42 cases: 10%).

Young developing tumors and old regressive ones, including those in all phases which pass from one to another almost without interruption, are included in group 1. The authors found two kinds of evolution: (1) regressive change (perhaps the most frequent), and (2) progressive transformations leading to more voluminous and, therefore, more atypical forms compared with fibroadenoma.

Progressive transformations lead to the second group, intracanalicular fibroadenoma with sarcomatous aspects, of which certain forms are found in some parts of the sections. These, because of their more distinct prolific activity, look like forms existing in phylloid cystosarcoma (wider splits, cystic dilatations, intracavitary papillary arborescence, very immature stroma). In other sections a pure intracanalicular picture is shown.

These aspects are considered a transformation from one intracanalicular form to another, and thereby the third group is reached, in which transformation is complete. There remains only the histological aspect of pure phylloid cystosarcoma.

It was found that tumors belonging to groups 1 and 2 may show regressive changes, probably the most frequent evolution. In very few cases, therefore, can the tumors reach the large size typical of cystosarcoma.

These findings are confirmed by statistical investigation of the average age of patients with the 3 aforementioned intracanalicular forms which show a progressive increase in age: 28.95 years for the

first group, 30.29 years for the second, and 34.41 years for the third.

From their research, the authors found evidence that cystosarcoma is derived from a progressive fibroadenoma, and they noted the relationship in development and proliferation between epithelium and subepithelial connective tissue which is responsible for neoformations.

The remaining 4 groups showed no relation to phylloid cystosarcoma.

The authors found an eighth group of cases which could not be better classified because of the scarcity of element. This they called "fibroepithelial tumors without clearly definite characteristics." Age statistics showed a minimum frequency for the age preferred by pure fibroadenoma and a maximum frequency for the marginal (puberal and menopausal) ages.

The authors reached the following conclusions:

1. The epithelium and the subepithelial connective tissue proliferate simultaneously, and both are responsible for neoformations.

2. Phylloid cystosarcoma originates in pre-existing intracanalicular fibroadenoma (considered the last progressively evolutive phase).

3. All intracanalicular fibroepithelial tumors may evolute regressively at any moment.

4. There is no relationship between phylloid cystosarcoma and fibroepithelial structures.

5. The rapid growth of Müller's tumor is due to deep structural changes initiating and evolving contemporarily, representing not the causes but the effects of a primary cause responsible for neoplasia.

6. Dysendocriniasis (especially of the genital system) and the condition of the mammary tissue of the neoplasia must be considered in the causative genesis of phylloid cystosarcoma and all fibroepithelial newgrowths. The condition of the mammary tissue will differ with various ages of life. Abnormal stimulations of dysendocrine nature will cause different reactions directly related to their intensity and the reaction of the tissues at that moment.

7. All histologic varieties of tumors originate from the reciprocal correlations of these two factors.

M. López-Belío, M.D.

TRACHEA, LUNGS, AND PLEURA

Chemically Treated (Lyophilized) Tracheal Grafts (Innesti di trachea liofilizzata). Francesco Natellis. *Arch. ital. chir.*, 1953, 76: 138.

A brief review of the literature concerning tracheal grafts is presented. Because of the eventual resorption and resultant flaccidity of the grafts, the results reported have been uniformly poor. The author suggested that a new method of preserving homografts might possibly contribute to the solution of this problem. If successful, the grafts could be preserved for an unlimited time in a central bank for distribution to other surgical centers when needed.

Segments of trachea were removed from suitable donor dogs, and the 6 to 8 cm. grafts were stripped of all extraneous connective tissue possible. The tissues were treated with solutions of 1 per cent merthiolate and 1.4 per cent boric acid, following which they were lavaged with a sterile solution of normal saline solution containing penicillin. The grafts were refrigerated, and then chemically desiccated and placed in glass tubes. Studies of segments preserved for 30 days at room temperature showed no significant histological change.

Treated grafts were sutured into 5 dogs. Sections of trachea approximately 2.5 cm. in length were resected and suitable lengths of grafts were substituted.

The first dog was sacrificed in 15 days. There was a good grade of consistency to the graft, but considerable redness and congestion were present.

The second dog died of tension pneumothorax after disruption of the anastomosis on the third day.

The third dog was sacrificed in 30 days. There was persistent redness, especially of the peritracheal tissues. There was firm attachment to the host tissues. The submucosal connective tissue adjacent to the cartilage was edematous. There was an abundant capillary network present. There was marked invasion by mononuclear cells.

The fourth dog was sacrificed in 60 days. The graft was red and edematous with a notable amount of softening. There was an increase in respiratory epithelium growing from the host tissues to the center of the graft. However, the epithelium was flatter and there was an absence of cilia. The cartilaginous portion was almost completely resorbed and replaced by connective tissue.

The fifth dog died in 4 months. There was severe edema of the graft which had practically melted away. There was complete collapse and stenosis of the trachea at the graft site.

Frank W. Pirruccello, M.D.

The Technique and Use of Segmental Resection in Pulmonary Tuberculosis (Technik und Anwendung der segmentalen Resektion bei Lungentuberkulose). E. Derra, H. Franke, and H. Rink. *Chirurg*, 1953, 24: 161.

Following a brief historical review of segmental resection for pulmonary tuberculosis and a description of the morphologic aspects of the pulmonary segment as regards the distribution of arteries and veins, both normal and anomalous, the technique of the operation is outlined. Endotracheal narcosis is used and the incision is made through the fifth intercostal space, with the patient in lateral decubitus. Flat pleural adhesions are liberated extrapleurally so that diseased pleura can be removed simultaneously, without opening infected lymph passages. The technique employed is similar to the standardized method of Overholt, Woods, and Ramsay.

Although tuberculosis of the lungs is a systemic disease primarily requiring internal therapy, cavi-

ties and tuberculoma are usually treated surgically. Since collapse and other methods have proved unsuccessful, more active methods are indicated. The end results of segmental resection can only be evaluated after a lapse of years. But the possibility of resecting cavities and tuberculoma segmentally and thus ridding the organism of an active focus of the disease would seem worth the risk. Chemotherapeutics and antibiotics exert their effect only along the blood stream. Cavities and tuberculoma constitute necrotic masses shut off from the blood stream, owing to obliteration of the blood vessels. For this reason the authors consider segmental resection indicated in: (1) tuberculoma of any lobe, (2) cavities of the inferior lobe, (3) subpleural cavities of the superior lobe, (4) recurring cavity formation following plastic operation without residual cavities in the surgical field, (5) the formation of specific foci in a rigid collapsed lung, if it is desired to encourage further expansion by decortication, and (6) specific empyema with bronchopleural fistula.

In spite of Overholt's objection to lung suture as a hindrance to expansion of remaining segments, the authors prefer to close the pulmonary wound with a continuous pleural suture. They share the opinion of Glover *et al.* that this is necessary in order to prevent late complications; also, after treatment plays a determining part in the success of segmental resections. Following termination of the operation, the lung is subjected to active suction until it fills half of the thoracic cavity. For bisegmental and plurisegmental resection, continuous suction for 24 to 48 hours will suffice and is omitted only occasionally in resections of a single segment.

Daily roentgen examinations will expose eventual exudate formation or air cavities that can best be treated by repeated puncture and aspiration. Postoperative shadows may be caused by atelectases due to bronchial obstruction with blood coagula and secretions. These usually disappear following spontaneous coughing up after 1 to 2 days; otherwise, endobronchial aspiration is applied. Hemorrhage may develop even several days after operation following extrapleural liberation of the lung. In one such case, a hematoma formed that had to be surgically removed 3 weeks later.

In a series of 42 cases of segmental resection for pulmonary tuberculosis, there were no fatalities. The group included 1 case of tuberculoma (2 segments resected), 13 cases of inferior lobe cavitation (33 segments resected), 15 cases of subpleural superior lobe cavitation (30 segments resected), 7 cases of rigid pneumothorax lungs with specific foci (14 segments resected), 3 cases of specific empyema with bronchopleural fistula (8 segments resected), and 3 cases of cavities beneath a thoracoplasty (6 segments and subsegments resected). In the 6 last mentioned cases, decortication was required. Complications included empyema in the case of tuberculoma, contralateral pleurisy in one of the lower lobe cavitations, and hemothorax in 1 case of subpleural superior lobe cavitation. A careful analysis of the functional state of the lung and circulation is imperative before any segmental resection. With the use of differentiated analytical methods, the functional state of an individual lung segment, reventilation, and circulation can be determined. Excellent roentgenograms show the status before and after resection of the segment.

EDITH SCHANCHE MOORE

Surgical Treatment of Tuberculosis by Pulmonary Resection (La resection pulmonaire dans le traitement chirurgical de la tuberculose). ALFRED DUMONT and H. HOMORÉ. *Acta chir. belg.*, 1953, 52: 431.

This monograph has been written by 15 authors, each one dealing with the subject on which he is an authority. The essay consists of several chapters. The first chapter deals with the pathologic anatomy of the lungs; the second describes the medical aspect of pulmonary tuberculosis; the third is devoted to a description of the function of the lungs; the fourth treats the subject of anesthesia; and the fifth chapter comprises the wide field of pulmonary resection.

The operation was performed on 70 patients. While in the age group up to 45 years there were 7 men and 7 women, the entire group past that age consisted of men exclusively. Residual cavities were present in 50 per cent of the entire series; destruction of the lung was present in 20 per cent, empyema in 20 per cent, and giant cavities in 10 per cent. Operative death occurred in 6 per cent; postoperative fatalities within the first 30 days occurred in 11 per cent, and after 30 days in 15 per cent. Bronchial fistula and empyema developed in 9 patients, and in 5 of these death occurred as the result of erosion of intercostal blood vessels. The total mortality during the period of observation was 38 per cent after pleuropulmonectomies, 35 per cent after pulmonectomies, and 24 per cent after lobectomies.

Evolution of pre-existing foci or development of new ones was noticed in 5 patients in a group of 58 observed longer than 1 year after the intervention.

Follow-up studies showed that of 48 patients who survived the operation, the results were good in 38 patients (54 per cent), and poor in 10 patients, (14 per cent). The mediocre results are ascribed to a poor appraisal of the patient's resistance.

While some authors advocate substitution of pulmonary resection for collapse therapy, less courageous surgeons reject, unconditionally, the radical procedure. According to the authors, lobectomy or pulmonectomy should be reserved for lesions which do not respond to classical therapeutic measures.

JOSEPH K. NARAT, M.D.

Focal Lymphogranuloma: Pulmonary and Cerebral Lesions (Sul linfogranuloma localizzato). E. VINDIGNI. Policlinico (sez. med.), 1953, 60: 123.

The author discusses the clinical and pathological findings in a patient with malignant lymphogranuloma.

A 45 year old male entered the clinic with a 3 months' history of malaise, fatigability and anorexia. Two weeks prior to admission, the patient developed persistent pain in the right chest. On the morning of admission, he was unable to get out of bed and was found to have a right hemiplegia. On admission, the right hemiplegia was confirmed and there was dullness and diminished breath sounds in the right upper lobe of the lung. The red blood count was 3,400,000 and the white blood count was 7,500, with neutrophiles 69 per cent, eosinophiles 2 per cent, basophiles 1 per cent, monocytes 2 per cent, and lymphocytes 26 per cent. Spinal fluid was under normal pressure, and the Pandy reaction was 1+. The clinical course was rapid; the patient became comatose and died the second day of admission.

The autopsy findings revealed a large apple-sized consolidation of the superior lobe of the lung on the right. On cut section, there was a diffuse solid gray-yellow mass with numerous hemorrhagic foci. The hilar glands were normal and the spleen presented only congenital malformation. In the brain there was a subcortical mass in the left occipital lobe. This was replaced in part by areas of necrosis and liquefaction. The meninges and basal ganglia were not involved and the ventricular system was not involved. Microscopic sections showed the presence of a polymorphic cellular structure. Sternberg cells were seen in large numbers. Eosinophiles were rare and there was an abundance of polymorphic neutrophiles, plasma cells, and lymphocytes. Under special stain a fine reticular pattern of precollagenous fibers was outlined. The cerebral involvement presented a similar structure except for the presence of numerous areas of necrosis. There was also absence of the reticular pattern, but argentophilic fibers were seen in the immediate vicinity of the capillaries.

In this case there was an absence of pruritus and fever. The spleen was not involved and there was no marked eosinophilia. The course of the disease was acute and fulminating.

The author asserts that the presence of typical Sternberg cells confirms the diagnosis and differentiates this case from that of a lymphoblastoma. He considers the cerebral involvement secondary to the pulmonary focus. R. A. MANFREDI, M.D.

HEART AND PERICARDIUM

Transposition of the Great Vessels. JOHN D. KEITH, C. A. NEILL, PETER VLAD, R. D. ROWE, and A. L. CHUTE. *Circulation*, 1953, 7: 830.

Familiarity with clinical and postmortem findings in complete transposition of the great vessels now makes the diagnosis possible during life, in the vast majority of cases. The patient is usually a baby in the first few weeks of life, who has been markedly cyanotic since birth. Two to one, the chances are that it is a boy. He is underdeveloped and the gain in weight has been slow. When examined, a third of these infants have no murmur. In all, the electrocardiogram shows right axis deviation. An x-ray film of the heart shows a relatively normal contour at birth, but 3 to 4 weeks later there is a fairly characteristic shape. The heart, by that time, is enlarged to both right and left and there is a convex left border. The area of the great vessels appears narrow in the anteroposterior view. The hilar shadows are increased. Angiocardiography shows the aorta coming clearly off the right ventricle. Sometimes this procedure may outline the pulmonary artery as well, and aid in determining the presence or absence of associated defects. These diagnostic criteria have proved very satisfactory and the high natural mortality permits one to check the diagnosis frequently.

Operative techniques for this condition have been directed mainly to the venous return. It is now suggested that transferring the arterial trunks to their proper ventricles might prove to be a more satisfactory procedure. To carry this out, an artificial heart and lung preparation is necessary. Furthermore the coronary circulation must be maintained during the procedure and carried over, with the aorta, to the proper ventricle. Recent work by Mustard and Chute suggests that this procedure may be feasible. JOHN J. MALONEY, M.D.

ESOPHAGUS AND MEDIASTINUM

Narrowing of the Trachea and Esophagus by Congenital Malformation of the Mediastinal Vessels and Their Management (Einengung von Trachea und Oesophagus durch kongenitale Missbildungen der Mediastinalgefaesse und ihre Behandlung). H. KRAUSS. *Thoraxchirurgie*, 1953, 1: 25.

The embryologic development of narrowing of the trachea and esophagus by congenital malformation of the mediastinal vessels is carefully described. There are four main types.

1. The double aortic arch, which is never demonstrated in a living person.

2. The type in which the right subclavian artery arises from a diverticulum formed by the remainder of the right primitive aorta, the last vessel coming from the arch of the aorta. Therefore, the left and

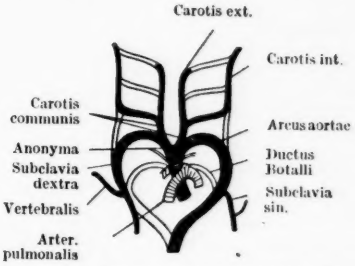


Fig. 1 (Krauss). Diagram of the normal development of the large blood vessels.

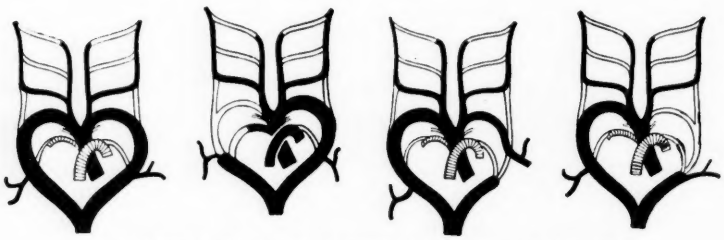


Fig. 2 (Krauss). The four main types of blood vessel malformations.

right subclavian arteries lie close to each other. The aorta crosses behind the esophagus on the right side.

3. The type in which the origin of the right arch of the aorta is from the artery of the right fourth tracheal arch. The aorta comes directly from the left ventricle and bends before the trachea to the right. The arch of the aorta rides on the right main bronchus. The arch then curves behind the esophagus and connects with the left descending aorta (arcus circumflexus). The arteries arise from the arch in the following order: left subclavian artery, left common carotid artery, right common carotid artery, and right subclavian artery. Distally from these there is usually a diverticulum of the aorta. It lies dorsal to the esophagus.

4. From the right-bending aorta comes the left subclavian artery as the last vessel on the arch from a dorsally situated diverticulum of the aorta. It crosses behind the esophagus to the left.

Sometimes the right aorta is associated with anomalies of the heart itself, such as septal defects or pulmonary stenosis. All of these anomalies have in common a narrowing of the trachea and especially one of the esophagus. Sometimes it manifests itself in the newborn, or it comes later when, because of heavier body weight, there is a greater load on the circulation.

Signs of stenosis of the trachea will be seen only when the double arch of the aorta is present. Usually it leads to an early death. Since 1796 all dysphagias on the base of the vessel anomalies were called "dysphagia lusoria" (Bayford). In the differential diagnosis, tumors, aneurysm of the aorta, and foreign bodies must be considered.

X-ray diagnosis is made by finding the root of the aorta on the right side and noting its absence from its usual location. Proof of the diagnosis is a large pulsating shadow behind the esophagus, especially in the first oblique view. Compression of the esophagus from behind is the rule when the right descending aorta is present, and it is diagnostic. If not present, it does not exclude the diagnosis.

A 34 year old housewife, first seen in June, 1951, had the feeling of a drag in the upper thorax and lower neck after exertion. She could not breathe fully and only with a whistling sound. Occasionally she experienced shortness of breath. With menses there was an increase of the symptoms. Examination did not give an impression of decompensation or mediastinal tumor. X-ray examination showed the right aorta. At the level of the manubrium there was an enlargement and displacement of the esophagus to the left and anteriorly. It was caused by a pulsating shadow, the size of a tomato, behind the esophagus. The trachea was drawn slightly to the left and strongly forward. In the lateral view a stenosis of the trachea was seen at this level which measured 8 mm. anteroposteriorly as compared with 16 mm. above this point. Its length was about 3 cm.

With endotracheal anesthesia, right lateral position resection of the third left rib was made and the thorax opened. There was a right aorta, and the first vessel was the left common carotid artery. The left subclavian artery ran upward from the diverticulum of the aorta, which lay behind the trachea and the esophagus. There was no remnant of the left arch of the aorta, but there was a band 2.5 mm. thick (the obliterated ductus arteriosus) between the diverticulum and the pulmonalis, around which the recurrent nerve wound and was stretched. The duct, which was considerably stretched, was ligated and cut. The ends retracted to a distance of about 2.5 cm. This eased the pressure on the trachea and the esophagus. Since the operation the patient has been free of symptoms.

Two cases of Sweet and 1 case of Gross were cited and compared. M. LÓPEZ-BELÍO, M.D.

Benign Tumors and Cysts of the Esophagus. R. S. TOTTEN, A. P. STOUT, G. H. HUMPHREYS, and R. L. MOORE. *J. Thorac. Surg.*, 1953, 25: 606.

The authors report a case of leiomyoma of the esophagus and another of a congenital cyst of the esophagus.

This review of benign tumors of the esophagus seems to show that they may be divided into two groups: the intraluminal and the intramural.

In the former group, most of the tumors are fibrous polyps, although polypoid lipomas and leiomyomas occur. The majority of these are attached in the region of the cricoid cartilage. Sessile intraluminal growths are seen, but rarely, if ever, are they of clinical importance. The solid intramural tumors are predominantly leiomyomas and may be found at any level.

The intramural cysts are congenital in origin and usually contain derivatives of the primitive foregut. Most of these occur in the middle or lower thirds of the esophagus. Supernumerary tissues, other than gastric epithelium, rarely appear in the esophagus, and inflammatory conditions are not common. The tumors, particularly the polyps, may present considerable diagnostic difficulty, but roentgenography and esophagoscopy are helpful. Most of the polypoid tumors may be removed via the esophageal lumen, whereas a thoracic or abdominal approach plus enucleation and/or resection is necessary to treat the intramural growths. There are malignant polypoid and intramural tumors which clinically mimic the benign growths. Provided an accurate diagnosis is made and proper therapy employed, a good prognosis may be expected. ROBERT L. CRAIG, M.D.

MISCELLANEOUS

Correction of Scoliosis by Spreading of the Ribs (Beeinflussung der Skoliose durch Rippenspreizplastik). WILLI FELIX. *Thoraxchirurgie*, 1953, 1: 48.

The author asserts that only cases of scoliosis observed during the period of bodily growth are amenable to surgery. There is no one method known today which assures permanent straightening and at the same time assures mobility of the spine. Hibbs' method of spinal fusion is fairly satisfactory, but it is a major procedure and has a certain percentage of mortality. It also requires a long postoperative period of additional treatment and adjustment. Muscle operations are devoid of danger but do not give good results. The psychological effect of fusion is also a depressing one, especially for children and teen-agers. The method of Frey and Sauerbruch is not satisfactory either. They made an approximation of the ribs with wires on the side of the convexity of the spine and cut through them on the side of the concavity. The author tried this method on 16 cases in 1949 and 1950, but the results were not encouraging. The resulting straightening in most cases was not permanent. Once there was even impairment of the previous situation.

Therefore, a new method was devised; it consisted of the approximation by wires, in this case double ones. On the concave side the ribs were spread by means of bony implants taken from the tibia of the patient. It was the direct opposite of the previous technique. In the paravertebral region the ribs were spread and pulled apart. The role of the implants was to keep the spread ribs apart by preventing their approximation.

The postoperative results of the first case are shown in pictures, but after 4 weeks the approximation wire loosened and the implants fell out. Two more cases were shown, one of which was overcorrected. Seven patients have been operated upon thus far.

The author thinks that this method is worth trying and claims better results than those from the original Sauerbruch-Frey method. He also mentions the possibility of using bony implants with periosteum to prevent atrophies and to gain a more permanent consolidation. He wonders how this method will influence the problem of scoliotic torsion. Since he has not had occasion to operate on too many scolioses, he invites everyone interested to help evaluate the new method. MARIANO LÓPEZ-BELFO, M.D.

SURGERY OF THE ABDOMEN

GASTROINTESTINAL TRACT

Profuse Mucosal Hemorrhages on a Neurovascular Basis. Clinical and Experimental Observations (Zur Frage der profusen, neurovasculaer bedingten Schleimhautblutungen. Klinische und experimentelle Beobachtungen). W. WACHSMUTH. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1953, 274: 490.

Four cases of profuse gastric hemorrhage and 1 case of renal hemorrhage are reported. The first case was reported in detail in 1942 by the author (*Chirurg*, 1942, p. 596). The operation in brief was a Billroth II gastric resection for duodenal ulcer. The patient died on the fifth postoperative day from the profuse vomiting of blood. The resected portion of the stomach was perfectly normal; the residual gastric stump was densely beset with small, bleeding erosions (proof of postoperative development of the hemorrhagic condition).

The second patient was a 61 year old woman with stenosis of the choledochus, who underwent a hepaticoduodenostomy. On the thirteenth postoperative day profuse gastric hemorrhages occurred which led to death on the following day. Autopsy disclosed a mucosal erosion on the lesser curvature, 4 cm. long and 1 cm. wide, from which the bleeding had arisen.

The third case was that of a 37 year old woman, with marked sympathetic stigmatization, who had been under medical observation for the past 11 years for ventricular ulcer. Four times during this period she had suffered massive gastric hemorrhages; the first bout of bleeding was incident to the drafting of her husband for military service, the second occurred when she was informed that her husband was a captive, the third bout followed an air-bombardment, and the fourth seemed incident to a family quarrel. A gastric resection was finally done. Histologic examination of the resected specimen disclosed no abnormality other than a profuse parenchymatous mucosal bleeding with dilated blood vessels and escape of blood through the interstices between the epithelial cells. The congestive appearances were quite superficial.

The fourth patient was a 56 year old female who began to hemorrhage from the bowel without previous symptoms. The bleeding could not be influenced by medical measures and the patient was laparotomized with coincidental blood transfusion. The cecum, the ascending colon, and half of the transverse colon were resected. The bleeding ceased at once; the patient recovered rapidly and for the past 5 years has had no further trouble.

The fifth patient was a 55 year old woman who had been suffering from hematuria for the past 5 days. The pathology of the condition could not be demonstrated, other than that the issue of blood came from the ureteral opening. Under suspicion of hypernephroma the left kidney was removed and histological examination of the specimen disclosed a striking condition of massive submucous bleeding with markedly distended capillary loops in the region of the renal pelvis. The epithelial covering of the renal pelvis itself was everywhere intact and well conserved.

From a study of these cases it would seem rather obvious that a neurovascular element was at work. However, before publishing these observations the author desired to see if similar lesions could not be produced in experimental animals by stimulation or irritation of the neurosympathetic system. In this experimental study 45 rabbits were used. Hyperemia of the superficial vessels of the gastric mucosa could regularly be produced with pervitin (8-β-phenyl-isopropyl-methylanin), an adrenalinlike and ephedrinelike preparation, which was given by intramuscular injection. Such bleeding was obtained with strychnine in only 1 instance (central nervous system irritation). No mucosal bleeding, hyperemia, or indications of stasis could be obtained with aktamin (1-noradrenalin), or with buscopan (a spasmolytic preparation). With histamine and with the vagus stimulator, acetylcholine, mucosal changes could in every instance be produced. In a large series of experimental animals hyperemia of the gastric mucosa and of the mucosae of the small intestine and of the kidney pelvis could be observed, as well as submucosal and mucosal bleeding, accompanied by defects of the epithelium and by the extravasation of erythrocytes at these places.

With the operative cutting through of the fibers of the vagus nerve leading to the lesser curvature, areas of petechial bleeding could be seen in the gastric mucosa, and yet more striking were the manifestations of vagus disturbance with faradic stimulation of the celiac ganglion. Following this procedure numerous instances of changes in the stomach and duodenal mucosae, in the kidneys, and in the kidney pelves were observed. Stasis and extravasation of blood could be regularly observed in the histologic picture of hyperemia. In all these animals an inflammatory component and vascular changes, in the sense of a sclerosis, could be excluded.

Thus, from a study of the reported instances and of the experimental results, the author concludes that the neurovascular theory for the origin of "essential" and postoperative mucosal hemorrhages in the stomach, intestines, and kidney is to be considered as clinically and experimentally demonstrated.

JOHN W. BRENNAN, M.D.

Jaundice After Gastric Resection (L'ittero nei gastroresecati). LUIGI PARODI and ENZO CAPPELLINI. *Rass. ital. chir. med., 1952, 1:179.*

The authors believe that the occurrence of jaundice following gastric resection is a rare but discrete

occurrence. They believe that this complication may occur in the immediate postoperative period or several months after the patient's discharge from the hospital. This jaundice shows the characteristic clinical findings of an obstructive type of jaundice and is frequently associated with pancreatitis.

The early postoperative form is usually the result of local inflammatory changes due to manipulation about the duodenum and the common duct; the late form is considered due to a papillitis or a sclerosing cholangitis—the latter perhaps precipitated by inclusion of the papilla in the duodenal stump closure.

The prognosis has been found to be quite favorable in the early cases and the jaundice slowly subsides with conservative or temporary external biliary drainage. The more severe, late form which involves an obstructive factor may require some form of internal biliary anastomosis to relieve the jaundice.

The authors report a case of early icterus associated with acute pancreatitis and review the literature. GEORGE L. NARDI, M.D.

Regeneration of the Gastric Mucosa (Die Regeneration der Magenschleimhaut). G. LEVANDER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1953, 274: 255.

An investigation was made into the mode of regeneration of gastric mucosa. The technique employed consisted of subjecting the stomach of rabbit embryos to trypan blue staining. This resulted in destruction of the superficial layers of the mucous membrane. Portions of stomach wall were then implanted subcutaneously into the mother rabbits. Regeneration recurred in most instances. When it did, there was invariably a cystic structure at the site of the implant. It was of particular interest that although the basal plate stained blue, the regenerated specialized cells of the gastric mucosa did not contain pigment in any instance, either in their cytoplasm or nuclei. It was therefore concluded that the columnar cells did not actually arise from the basal plate. On the contrary, the author theorizes that the degeneration of the original mucous membrane caused by the trypan blue stain released a specific factor. This factor of regeneration is stimulated to induce the growth of cells by virtue of the granulation tissue at the implantation site. The author believes that this factor is identical with the embryonic induction mechanism and that post-fetal regeneration is a recapitulation of embryonic differentiation of tissue. HAROLD LAUFMAN, M.D.

Acute Intussusception. DON L. THURSTON, JEAN HOLOWACH, and ERNEST E. MCCOY. *Arch. Surg.*, 1953, 67: 68.

Among 116 consecutive cases of acute intussusception observed at the St. Louis Children's Hospital between 1934 and 1951, 60 per cent occurred in males. Their ages varied from 6 weeks to 9 years. There was no racial predisposition between negro and white. There is a peak seasonal incidence during August which corresponds to the peak seasonal incidence of nonspecific diarrhea.

Meckel's diverticulum was present in 11 cases and acted as the apex of the intussusception in 9 of these. In 2 cases intussusception was initiated by adenomas of the ileum, and in 1 case by a duplication cyst of the ileum. There were 3 instances of malposition of the cecum and associated abnormalities of mesenteric attachment due to malrotation. In 2 of these cases the excessive mobility of the bowel was believed to be responsible for the intussusception. In 6 other cases the bowel had an unduly long mesentery. In 3 cases intussusception was believed to be due to an extremely large ileocecal valve. Of uncertain significance was the presence of fibrous adhesive bands, which varied in density from filmy strands to thick cords in 13 cases. Thus, more factors of direct etiologic importance were present than in most reported series of cases.

The classical triad of sudden onset of abdominal pain, vomiting, and blood in the rectum in infancy should be regarded as intussusception until proved otherwise. If an abdominal mass cannot be felt with certainty, one hesitates to make a diagnosis of acute intussusception. However, when the mass is in the region of the hepatic flexure beneath the liver edge and costal margin it may not be palpable.

In 33.6 per cent of the group of 116 cases the diagnosis of intussusception was made within 12 hours of onset. In 56.8 per cent the duration of symptoms was less than 24 hours. Fourteen of the 116 patients had signs and symptoms of intestinal obstruction for 96 hours or longer.

Rectal temperatures on admission were over 37°C. (98.6°F.) in 91.3 per cent of the cases and over 38°C. (100.4°F.) in only 45.6 per cent. There were 23 patients with admission temperatures of 39°C. (102.2°F.) or more. There was no correlation of the temperature elevation with the morbidity and mortality.

The white blood cell count and differential count appeared to be of both diagnostic and prognostic value. White counts ranged from 3,600 to 40,300. In 64.9 per cent of the cases they were over 10,000. The white count bore no relation to the duration of the symptoms; however, there was a striking increase of the left shift in the Schilling differential count with increasing symptom duration, and the extent of this shift varied directly with the incidence of gangrenous and irreducible bowel and death.

In no case was nonsurgical reduction of the intussusception purposefully attempted; however, there were 8 patients who did not require surgery and 7 patients who showed evidence of recent spontaneous reduction at the time of exploration. Ninety-two were reduced manually by taxis. Twelve patients were treated by resection and anastomosis, and other procedures were used in 5. Appendectomy was performed in 44 per cent of the cases and there were no deaths in this group. Bowel fixation was done in 12 cases as prophylaxis against recurrence and in 4 the procedure was followed by intestinal obstruction due to adhesive bands. For this reason, cecopexy, colopexy, or mesenteric plication seems inadvisable.

The incidence of gangrenous or irreducible bowel was 14.6 per cent, 17 cases. None were of less than 12 hours' duration and 70.5 per cent were of more than 48 hours' duration. There were 8 deaths and 9 survivors in this group, a mortality of 47 per cent.

There were 10 deaths in the entire series of 116 cases, a mortality of 8.6 per cent. Only 2 deaths occurred in the group of patients undergoing manually reduced intussusception with viable bowel.

FREDERICK W. PRESTON, M.D.

Diverticulitis. O. V. LLOYD-DAVIES. *Proc. R. Soc. M.*, Lond., 1953, 46: 407.

This article has been based upon a study of 59 patients seen in the last few years, 56 of whom were operated upon; all those with diverticulosis or mild diverticulitis were excluded, and the clinical material covers most of the usual complications. Of the 3 patients not operated upon, the first was a man who developed a pelvic abscess from a ruptured diverticulum 9 months after a pneumonectomy for carcinoma of the bronchus. The abscess ruptured spontaneously into the rectum. The remaining 2 patients not dealt with by operation presented cases of hemorrhage. In each case the hemorrhage was profuse, partly altered and quite alarming; both patients were treated conservatively and with blood transfusions. Barium enema and sigmoidoscopic examinations revealed extensive involvement of the colon by diverticula but no new growth. It is likely that these hemorrhages were due to ulceration of a large vessel within the wall of a diverticulum.

There were 9 other cases of bleeding of a minor character in this series which were found at sigmoidoscopy. Sigmoidoscopic examination is essential prior to bowel preparation so that no bleeding will be missed. The discovery of bleeding of this type influences the decision to operate and in 6 of these cases new growths were found to be associated with the area of diverticulitis. Two of the cases were carcinomas recognized at laparotomy but in the 4 others unsuspected adenomas were removed—two of which later proved to be malignant. It is not only difficult for the radiologist to detect tumor formation within an area of diverticulitis, but it is also frequently impossible to detect it clinically because of the dense fibrosis. Occasionally, the bleeding may be from small areas of granular mucosa surrounding the openings of the diverticula. Exploratory laparotomy alone was carried out in 4 of the cases because there was doubt about the diagnosis—a small filling defect in association with diverticulosis. In all of these cases only a small area of diverticulosis was found in a rather short sigmoid loop. In 2 of the cases additional confirmation of the diagnosis at laparotomy was obtained by means of the sigmoidoscope introduced through the anus and threaded through the freed loop. In 2 of these cases the greater omentum was wrapped around the area of diverticulosis which left the bowel in place. This method may still be used to advantage in cases in which a resection is either not possible or not indicated. The omentum will wall off the area and prevent fistula formation into other hollow organs.

A colostomy is advisable in all those cases with the most serious complications and it is best to place it in the right half of the transverse colon to allow the greatest possible freedom of access when an attempt is made at a later stage to resect the area involved. When there is a frank abscess or gross fecal contamination this should be drained at the time, but localized peritonitis will usually respond to treatment with antibiotics. A colostomy operation was performed on 19 patients in this series; 8 of them still have colostomies and in only 2 of these is a resection being contemplated. There will inevitably be a group of unresectable cases either on account of age or poor risk, or because the colostomy has failed to control the infection. It cannot be assumed that the infection will subside once a colostomy is established. Two of these patients have had recurrent pelvic abscess and 2 had complications in the form of a severe proctocolitis with associated chronic pelvic inflammation. Another, who has since had a resection, developed a vesicocolic fistula 7 months after the operation. Presumably the narrow neck of the diverticulum does not provide adequate drainage of the bowel. Some degree of improvement can be obtained in these cases by irrigating the distal loop with antibiotic solutions. The usual solution consists of 1 dram of streptomycin in 4 oz. of water. If it is contemplated to leave the colostomy for a long period of time it is well to place a bridge of skin between the distal and proximal ends. It is the author's feeling that once a colostomy has become necessary it is either a permanent one or it should be closed only after the diseased bowel has been resected. Diverticulosis being a progressive condition, the probability of further trouble is very likely once the state of diverticulitis has been reached. It would appear to be very unwise to close an established colostomy without resecting the diseased bowel.

In the remaining cases under review there were 38 resections and 4 combined excisions. The 4 excisions were performed under the impression that an extensive new growth with diverticulitis was being dealt with, the type of case often referred to as a "frozen pelvis." In this type of case, it is frequently impossible to obtain biopsy evidence and barium enema examinations are inconclusive as they reveal the presence of diverticula but leave doubt whether a filling defect or area of stenosis is present. If there is doubt it is wiser to act as though the condition were definitely neoplastic. Of the 38 resections, 29 were sigmoid resections, 7 were left hemicolectomies, and 2 were total colectomies; all of the patients have done well.

LEROY J. KLEINSASSER, M.D.

Results of Treatment of Acute Small Bowel Obstruction. JOHN A. BOLLINGER AND EDSON F. FOWLER. *Arch. Surg.*, 1953, 66: 888.

The authors have drawn their clinical material from a nonuniversity hospital of 375 beds for the

period from 1945 to 1951, and review 205 cases of acute small bowel obstruction, which was definitely proved by surgery or autopsy in 175 of this group. During this period the incidence of small bowel obstruction has progressively increased from 0.36 per cent of all surgical admissions in 1945 to 0.65 per cent in 1951, an average incidence of 0.47 per cent. Postoperative adhesions were responsible for the obstructions in 41 per cent of the 205 surgical patients. Congenital defects represented an incidence of 38 per cent and constituted the second most frequent cause of small bowel obstruction. Neoplasms constituting 5.9 per cent, gallstones 2.4 per cent, and regional enteritis 2 per cent, complete the list of causes of small bowel obstruction. Since the presence of strangulation markedly affects both the treatment and mortality in case of small bowel obstruction, it is important to know in which conditions this complication is most common. In a statistical analysis, it was found that 18 per cent of the patients with adhesions, 47.9 per cent of those with hernias, 75 per cent of those with intestinal anomalies, and 25 per cent of those with neoplasms had such changes. Obviously, in all cases of mesenteric thrombosis, strangulation occurs at the onset, whereas in the remaining conditions, strangulation was clearly secondary to the changes caused by incarceration over too long a period and by distention, which have impared the blood supply to the bowel. Altogether, in 32.2 per cent of their 205 patients, damage to, or destruction of, the blood supply to the bowel was exhibited at the time of surgery or at autopsy.

The authors warn that certain precautions in the management of small bowel obstructions are important. Decompression must not be employed as definitive therapy in the presence of strangulation nor its use continued in the absence of signs of improvement in the patient's condition. The necessity for surgical intervention in the presence of strangulation is obvious, but the point at which failure of decompression should be admitted is less definite. However, they believe that a time limit can and must be placed upon attempts at decompression as the sole treatment. They believe that if benefit is to be derived from decompression, there should be definite evidence of this within 24 hours after its institution. If this does not occur one should resort to operation without delay since otherwise there will be a rapidly increasing mortality. They prefer the use of the Harris tube and emphasize that decompression should be rapid, efficient, and continuous. The progress of the tube can best be followed by roentgenographic examinations. It is emphasized that the tube, being down in the small intestine, not only aids in the location of the obstruction but also reduces abdominal manipulation, aids in rapid decompression of the residual dilated bowel, and makes abdominal closure easier. It also provides a safety factor by insuring decompression of the suture line should resection of the bowel be required. There is an increasing incidence of strangulation with the passage of time and this can be shown by plotting the degree of leucocytosis, the degree of febrile response, or the duration of unrelieved symptoms, such as pain, against time. It is likewise evident that the incidence and severity of manifestations indicative of strangulation not only increase with the duration of symptoms but are paralleled by an increasing mortality rate, as indicated by a mortality rate of 6 per cent during the first 48 hours, 13 per cent during the succeeding 24 hours, and 38 per cent or higher in the period thereafter. This also means that the surgery becomes more serious and the surgical mortality remains proportional to the magnitude of the operation. The danger signals are increased pain or abdominal tenderness, increased pulse rate, or the development of a mass. The signs which appear later are largely those of peritonitis, i.e., muscle spasm, fever, leucocytosis, and, still later, shock. The relation of the operative procedure to the mortality rate in 167 cases is reviewed and it is noted that in the release of obstruction there were no deaths, in resection of nongangrenous bowel there was 1 death among 14 cases, in resection of gangrenous bowel there were 10 deaths among 32 cases, and in resection of perforated gangrenous bowel 6 deaths among 15 cases, representing an over-all mortality of 10.1 per cent. It is emphasized that the patient must be repeatedly checked to detect early signs of strangulation, and it is evident that the use of sedatives or narcotics is contraindicated during the period of decompression so that significant symptoms and signs are not masked or incorrectly evaluated. During this period the patient is prepared for surgery by the correction of fluid and electrolyte imbalances, and the caloric deficit is reduced by the use of 10 per cent dextrose. The administration of wide spectrum antibiotics is also urged.

Of the 205 patients with small bowel obstruction, 6 were moribund on admission and could not be influenced by any form of therapy. Of the remaining 199 patients, 135 showed indications for surgery as soon as the dehydration, distention, and electrolyte imbalance could be corrected. In 64 patients intestinal intubation was attempted as definitive therapy, and although the tube was passed successfully beyond the pylorus in more than 80 per cent, it was successful in completely relieving the obstruction in only 30 (46.7%). Surgery was performed in 61.8 per cent of the 34 patients in whom decompression was unsuccessful and in 32.2 per cent of those in whom strangulation was suspected. Of 64 patients in whom decompression was attempted as definitive therapy 6 died, thus giving an over-all mortality for decompression therapy of 9.4 per cent. However, of the 34 patients who eventually came to surgery as a result of failure of decompression therapy, 6 died, giving a mortality rate for this group of 17.1 per cent. When the 34 patients in whom decompression was attempted but who eventually came to surgery are excluded from the surgical statistics, it is found that of the remaining 133 patients oper-

ated on with conditions of all types, only 11 died, giving a mortality rate of only 8.3 per cent. A study of the 34 patients in whom surgery was ultimately required showed that unsuccessful decompression for less than 24 hours resulted in no mortality, whereas decompression for longer than 24 hours was accompanied by a rapidly increasing mortality rate, a rate which is higher than that associated with immediate surgery if all small bowel obstructions were submitted to surgery. A large proportion of the fatalities in small bowel obstruction has been associated with a condition sometimes known clinically as "closed loop" obstruction. Nowhere was this more frequent than in the case of obstruction due to adhesions, whether acquired or congenital. This condition was present in 10 per cent of the series, and in 91 per cent of the patients with such closed loop obstructions, strangulation was found at the time of surgery or autopsy. Conditions other than adhesive bands which may produce this picture are internal hernia and volvulus. The simultaneous occurrence of any two of the other causes of intestinal obstruction at divergent points is also possible. Unfortunately, it is difficult to make a diagnosis of closed loop obstruction in the early stages because of frequent absence or minimal evidence of classic signs of small bowel obstruction, such as distention or vomiting. In their experience, roentgenographic studies revealed an isolated distended loop of small bowel in only 50 per cent of all such cases and in only 50 per cent was such a distended loop palpable. In this group there was a 27.3 per cent mortality as compared with a 12.1 per cent over-all mortality rate. Once the findings on x-ray examination are negative, and there is no clinical distention and no manifestation of strangulation, with a passage of stools from bowel distal to the site of the supposed obstruction, they introduce 1 to 2 oz. of liquid petrolatum through the decompressing tube followed by clamping of the suction for several hours and then give an enema to see if this can be recovered in about 6 to 8 hours. In 42 cases in which this device was utilized the diagnosis proved to be accurate in 48 per cent of the cases. Such a clinical test, if one has been unsuccessful in obtaining liquid petrolatum in the enema return, will often reinforce the decision to operate before too much ground has been lost. If liquid petrolatum has been obtained, indicating absence of complete obstruction, a trial of feeding by mouth may be attempted if the enema is effectual. However, it is very important that actual food not be given in significant quantities until 24 to 36 hours have elapsed since the release of obstruction. The tube may be left in position and if the feedings are satisfactorily retained without vomiting or distention, the decompression tube may be removed, particularly if a stool is subsequently passed. Death in cases of small bowel obstruction is usually due to failure of the body defense mechanisms and/or failure of the cardiac, pulmonary, or renal system.

In the summary of the causes of death in their 17 postoperative cases the authors state that shock and peritonitis were responsible for 41.2 per cent of the deaths, and could have been largely prevented by earlier diagnosis and therapy. Cardiac failure, electrolyte imbalance, and possibly bronchopneumonia were responsible for the remaining 58.8 per cent of the deaths in their series. It is probable that many of the latter deaths may have been prevented if futile attempts at decompression had been terminated by surgery after 24 hours. Delay and the production of strangulation and peritonitis are, of course, major factors, but it should be realized that this delay also caused variable degrees of fluid and electrolyte imbalances and bronchopneumonia. However, the authors are gratified to note that as a result of improved treatment their surgical mortality has decreased from 14 to 6.6 per cent.

An analysis of the hospital course of 167 patients who underwent surgery revealed a total of 52 complications in 34 patients, an incidence of 20.4 per cent. There were 10 wound infections, 8 cases of postoperative ileus, 8 of atelectasis and bronchopneumonia, 7 of thrombophlebitis or pulmonary infarct, 5 of cardiac decompensation, 4 of fecal fistula, 3 of postoperative obstruction, 2 of hemolytic icterus, 2 of pyelonephritis, 1 case of penicillin reaction, 1 of diabetic acidosis, and 1 of spinal headache. Postoperative complications had diminished from 29.6 per cent in 1945 to 13.1 per cent in 1951, to produce an over-all morbidity rate of 20.4 per cent.

LEROY J. KLEINSASSER, M.D.

Primary Resection of the Colon in Acute Ulcerative Colitis. CHARLES B. RIPSTEIN. *J. Am. M. Ass.*, 1953, 152: 1093.

Because patients with acute ulcerative colitis are so acutely ill, there has been a tendency to avoid surgical treatment and, when it has become inevitable, simple ileostomy has been accepted as the operation of choice. The results of this therapy have been poor, and the mortality has ranged from 20 to 60 per cent in reported series of cases.

In analyzing the deaths that have occurred in the past, certain facts become apparent:

1. The majority of patients show evidence of severe blood and protein loss, and this continues even in the presence of a functioning ileostomy. The blood loss may amount to 200 to 300 c.c. and the protein loss to 150 to 200 gm. in 24 hours. The source of this loss is the diseased colon, and replacement in a severely ill patient is difficult and at times impossible. Ileostomy adds the factor of fluid and electrolyte loss.

2. Infection is an important factor in mortality. Sepsis and toxic absorption are universally present, and perforation of the colon is common (it occurred in 20% of the fatal cases). The source of infection is primarily the diseased colon. Since all of these factors are derived from the diseased bowel, the logical solution would be its removal, and, since primary resection of the colon is so well tolerated in debilitated patients with chronic ulcerative colitis, it has appeared worth while to evaluate the use of

this procedure in acute fulminating cases of the disease.

The indications for surgery are as follows:

1. The first is failure of medical therapy to produce a remission within a 3 week period. If a patient does not begin to improve within 3 weeks, further delay is dangerous.

2. The second indication is perforation, actual or impending. In the presence of frank peritonitis or free gas in the peritoneal cavity, surgical intervention becomes an emergency matter. In any patient in whom localized abdominal tenderness develops, impending perforation is suspected, and in these instances a plain roentgenogram of the abdomen often shows a markedly distended colon with little or no evidence of small bowel dilatation. These findings are an urgent indication for operation.

3. The third indication is the occurrence of continued or repeated bleeding, especially if hemorrhage is extensive enough to produce a shock state.

4. The fourth indication is the presence of septicemia or metastatic infection, such as endocarditis, pyoderma, or arthritis, which must be treated by removal of the primary focus after the administration of a preliminary course of antibiotics.

A left rectus incision facilitates mobilization of the splenic flexure and leaves the right side of the abdomen free for ileostomy. The colon is mobilized by freeing its lateral peritoneal attachments and detaching the greater omentum from the stomach. The mesenteric vessels are then ligated and divided, and the colon is removed to the level of the rectosigmoid. The terminal ileum is brought out through a stab wound in the right lower quadrant as a permanent ileac stoma. After the occurrence of 2 near fatalities from ascending ileitis, the author adopted Dennis' suggestion of doing frozen section biopsies of the terminal ileum and resecting enough so that the exteriorized bowel is microscropically free from disease. The divided rectosigmoid is exteriorized through a stab wound in the left lower quadrant. The rectal segment should be removed 3 to 6 months after the initial operation. It rarely heals after ileostomy and often gives rise to troublesome symptoms, such as bleeding, discharge, and fistula formation. An abdominal ileostomy with use of the Rutzen bag offers the most satisfactory solution.

In the past 5 years, one-stage resection of the colon to the level of the rectosigmoid has been carried out in 43 patients with acute ulcerative colitis. All were in a toxic state, with severe diarrhea and fever of 103 to 105°F. In 6 patients massive hemorrhage was a complicating factor, in 8 perforation had occurred, and in 3 there was evidence of metastatic infection. Two cases were complicated by carcinoma of the colon. Two deaths occurred, 1 due to ulcerative endocarditis and septicemia in a patient who was moribund at the time of transfer to the surgical service, and 1 due to peritonitis and intestinal obstruction after operation. The remaining patients all recovered, 1 dying subsequently from carcinoma of the bowel.

EARL O. LATIMER, M.D.

The Present Therapy of Carcinoma of the Rectum (Die gegenwaertige Therapie der Mastdarmkrebse). O. GOETZE and F. STELZNER. *Muench. med. Wschr.*, 1953, 95: 765.

In the authors' opinion, the danger of malignant degeneration of a polypoid adenoma of the large intestines in elderly individuals has been exaggerated by many writers. The span of life of such patients is too short for malignant transformation of the polyps; hence local procedures are sufficient for removal of adenomas or even precancerous lesions. On the other hand, total colectomy is indicated in younger patients with polyposis because they have sufficient time for malignancy to develop.

The authors offer the following classification of rectal cancer: group I is represented by a voluminous tumor which forms its own stroma, protrudes into lumen of the gut, and is called exophyte. Histologically, the slow-growing tumor is a highly differentiated adenocarcinoma. Ninety per cent of such tumors are operable. The tumors classified as group II and group III are also formed by highly differentiated adenocarcinomas. This type of tumor has a saucerlike or annular shape, grows towards the lumen and also towards the surrounding tissue, and is called mesophyte; it is the most frequent type of rectal carcinoma. The tumors classified as group IV are formed by a flat or ulcerating formation called endophyte. The tumor does not form its own stroma; it invades the surrounding tissues and, in 90 per cent of cases, is inoperable. Histologic examination shows a nonripe solid adenocarcinoma.

The authors are opposed to complete evisceration of the pelvis, and consider abdominoperineal resection the most radical procedure that should be employed.

Sphincter preserving procedures carry with them the danger of fistula formation. If the inferior mesenteric artery is ligated close to its origin from the aorta, the entire rectosigmoid can be removed, but the splenic flexure must be mobilized to allow an anastomosis between the descending colon and the anal stump. Mobilization of the splenic flexure is an extensive, technically difficult, and time-consuming procedure which is superfluous if one is dealing with a tumor of low malignancy.

The authors recommend a sphincter preserving operation only if the tumor is of low malignancy and is located not lower than from 10 to 12 cm. above the anus. Either an open abdominal or abdominosacral anastomosis can be employed. Obesity is a contraindication to such a procedure.

JOSEPH K. NARAT, M.D.

Surgery of Rectal Tumors (Cirugia de los tumores del recto). J. PI-FIGUERAS. *Cir. gin. Urol.*, 1953, 5: 4.

The author reports his experience with sphincter-saving operations for carcinoma of the rectal ampulla at a level no lower than 7 cm. from the dentate line. Similar conserving procedures are performed for lesions of the pelvic rectum and rectosigmoid area. Lesions which are 6 cm. or less from the dentate line

are deemed unsuitable for sphincter conservation and the Miles abdominoperineal resection is mandatory. Ligation of the vessels at the inferior mesenteric junction with mobilization of the descending colon to the splenic flexure is routine for lesions at the rectosigmoid area approximately 22 cm. from the pectineal line. The author employs exclusively the anterior abdominal resection in these individuals and those with lesions at the peritoneal pelvic dip. In obese subjects with the neoplasm in the lower pelvis, the author prefers the abdominosacral approach. He places the patient in the left lateral decubitus position, removes the last two sacral segments and coccyx, and proceeds with the anastomosis at least 3 cm. beyond the edge of the neoplasm. A modified Furniss clamp is employed routinely. Transverse colostomy or cecostomy is very rarely employed as an adjunctive measure, only when there is doubt concerning the integrity of the blood supply to the rectal stump, or unexpected induration and cellulitis in the vicinity of the lesion.

As is true in all neoplasms, early diagnosis is important; routine rectal palpation, sigmoidoscopy, biopsy, and roentgenography are procedures advocated in all lesions of the rectum, however benign the lesion may be. Operative success depends on proper preparation of the patient, antibiotics, blood replacement, the correction of protein depletion, and cardiovascular rehabilitation.

MIGUEL DROBINSKY, M.D.

The Internal Anal Sphincter. Its Surgical Importance. STEPHEN EISENHAMMER. *South Afr. M.J.*, 1953, 27: 266.

One of the main problems of anal canal surgery is acute and chronic spasm of the sphincter muscle. The severe postoperative pain of hemorrhoidectomy is due to excessive spasm, and the all too frequent stenosis following a normally executed radical operation is often of the same origin. The acute fissure is maintained by spasm and, if persistent, a chronic fissure becomes established on account of the irreversible chronic spastic state of the anal sphincter. The stenosed senile anal canal, known as senile stenosis or anal contraction, is a chronic spastic condition of the anal canal.

It is the author's contention that the internal sphincter plays a leading role in the normal functioning of the anal canal and is the key to the treatment of various conditions, namely, internal anal sphincterotomy. The anatomy and the physiology of this structure is carefully described. More than 400 operations of internal anal sphincterotomy have been performed since 1945 for the following indications; (1) senile stenosis, anal contraction, or spasmodic stricture; (2) postoperative stenosis; (3) congenital stenosis; (4) chronic anal fissure; (5) hemorrhoids with or without a chronic fissure when contracture of the sphincter is present; (6) uncomplicated hemorrhoids; (7) anorectal abscess; (8) lowlying intrarectal tumors; and (9) internal sphincter constipation. LEROY J. KLEINSASSER, M.D.

The Treatment of Injuries to the Anus and Rectum. DON W. MCLEAN and WARD SMATHERS. *Surg. Clin. N. America*, 1953, 33: 1193.

To determine the nature, relative importance, and methods of management of rectal injuries in civilian practice the authors reviewed the surgical records of two Detroit general hospitals for the years 1945 through 1952. In the combined group there was 1 rectal injury to each 1,600 surgical admissions. In the private hospital the ratio was 1 to each 1,900 surgical admissions, while in the city hospital, where many police cases and the indigent are cared for, the ratio was 1 to 1,400.

In this group of cases 67 per cent of the rectal injuries were incident to examination or treatment by attendants. The surgical injuries when immediately detected and properly repaired appeared to cause little if any increase in morbidity. The undetected or improperly repaired injury is always serious, with a prolonged and complicated convalescence. Adequate surgical drainage, careful approximation of the tissues, and the prevention or control of infection are the essentials for success in the treatment of injuries in or around the rectum.

BENJAMIN GOLDMAN, M.D.

LIVER, GALLBLADDER, PANCREAS, AND SPLEEN

Bilitinction. L. SCHALM. *Gastroenterology*, 1953, 24: 262.

By a special technique, consisting of stimulating the gallbladder to empty and a subsequent intravenous injection of 200 mgm. of bromsulphalein on the day before duodenal intubation, a bile sample can be objectively determined as gallbladder or B bile, by demonstrating the presence of bromsulphalein in this bile. Many difficulties in the interpretation of bile samples can be avoided in this way. As already observed by other authors, a darker bile can be obtained even from cholecystectomized patients. This same source of confusion has to be reckoned as a possibility in patients in whom an occluded gallbladder is present during a certain length of time. On the other hand, the concentrative power of the gallbladder may be deficient, no dark bile then being available. The author has given this procedure the name "bilitinction." The procedure is as follows:

At 11 a.m. the patient takes 30 c.c. of olive oil, and at 12 a.m. 2 raw eggs in a glass with equal amounts of cream and milk. The patient is allowed to take his normal lunch. At 5 p.m. 200 mgm. of bromsulphalein are injected intravenously. To prevent further gallbladder contraction as far as possible the patient is no longer allowed to eat, except for 2 rusks without butter, but with jam. At 7 p.m. he is free to take tea with sugar, but without milk. The next morning duodenal intubation is done in the usual way. After A bile is obtained, a small amount (±1 c.c.) of sodium hydroxide is added to check whether or not it contains bromsulphalein. After

this, 30 c.c. of oil are given through the tube. To the bile thus obtained sodium hydroxide is again added. If B bile is present, a bright red color is obtained. If not, 30 c.c. of oil are administrated a second time. If no bile is obtained that is capable of being colored, it is concluded that no B bile is present. In the cases in which a bile capable of being colored red is produced after the administration of oil, the duodenal intubation is continued until a bile sample is obtained that no longer turns red after the addition of sodium hydroxide. The use of magnesium sulfate as a stimulant for gallbladder contraction must be strictly avoided, as it causes thick deposits after sodium hydroxide has been added, and may make it difficult to detect the presence of bromsulphalein. EARL O. LATIMER, M.D.

Fibrosis of the Sphincter of Oddi. RICHARD B. CATTELL and BENTLEY P. COLCOCK. *Ann. Surg.*, 1953, 137: 797.

The condition of obstruction of the terminus of the common duct due to fibrosis of the sphincter of Oddi and the papilla of Vater is described. The development of dilatation and sphincterotomy and choledochoduodenostomy as therapeutic measures is recounted.

The authors cite the occurrence of stones in the common duct in 20 per cent of the cases of cholelithiasis as a reason for frequent explorations of the common duct. The association of spasm with choledocholithiasis and infection in the etiology of fibrosis of the sphincter and papilla at the exit of the common duct is well known.

In this series Bâkes dilators were used to establish the patency of the sphincter of Oddi. If a 3 mm. dilator cannot be passed easily through the ampulla, probably fibrosis of the sphincter or stricture of the papilla is present. A transduodenal exploration is then indicated. If forcible dilatation is possible and adequate, a long T tube is employed with a limb passed through the ampulla and into the duodenum and left in place for more than 6 months. Transduodenal sphincterotomy is performed in the cases in which forcible dilatation is difficult or impossible and a long T tube is also implanted and maintained for a long period.

Forty-nine cases are discussed and 6 are reported in this article. Complete relief of symptoms was obtained in 90 per cent of the cases.

ERNEST D. BLOOMENTHAL, M.D.

Radiomanometric Examination of the Biliary Ducts: Experience with 418 Cases. GUY ALBOT, CLAUDE OLIVER, and HENRY LIBAUDE. *Gastroenterology*, 1953, 24: 242.

After 10 years of experimentation, the authors described the practical methods for postoperative and preoperative radiomanometry of the biliary ducts. They prefer J. Caroli's biliary radiomanometry performed with the graphic recording technique. Its interest lies in the simultaneous comparison, at each stage of the test, of the morphologic appearance and the pressures, which reveal the transit pressure of Lutkens' sphincter, the residual vesicular pressure, the first and second differential, the threshold of induced pain, and the transit and residual pressure of Oddi's sphincter; the syndromes of up-graded residual pressure and of sliding residual pressures can be demonstrated.

This method yields information which excellent cholangiography would give; it has the advantage over the latter in providing supplementary information on the physiological behavior of the sphincter zones and on the most delicate irregularity in their function. The comparison of preoperative clinical and roentgenologic data with the results of biliary radiomanometry will permit the diagnosis to be considerably narrowed down, and lead to accurate therapeutic directions.

Cholangiography has shown that surgical exploration of the biliary ducts does not allow the existence of calculi to be confidently asserted, nor their location, nor affirmation of their removal, especially from the common duct. However, radiomanometry offers an advantage over the former method; if numerous exposures are made and filling by tenebryl is very slow, there is less danger of a calculus being obscured by the opaque substance than with cholangiography, and a mistake concerning the evacuation of calculi from the gallbladder or the common duct is practically impossible.

Equally as well as cholangiography, radiomanometry can locate large occlusive cancers of the pancreas which end at the upper edge of the duodenum, and cancers of the biliary canals. But it can also reveal, much better than cholangiography, minute cancers in the region of Vater's ampulla, which are not always stenosing. Delicate morphologic signs such as the lengthening or irregularity of the intramural tract will be confirmed by manometric verification of comparative hypertension of Oddi's sphincter, high transit pressure, a slight second differential, and up-graded residual pressure of Oddi's sphincter. The same applies to inflammatory lesions of the common duct and pancreas. Radiomanometry can reveal their usual morphological appearance, with a tapering of the lower third of the duct in cases of choledocho-odditis. Often it is superior to cholangiography in revealing hypertension of the sphincter of Oddi in early or paralithiasic odditis by the juxtaposition of slight morphological irregularities of the intramural tract and slight manometric irregularities of sphincter pressure. These lesions cannot only be located, but their evolution can be checked by successive biliary radiomanometries sometimes repeated over several months; drainage can be stopped at the most favorable moment.

It is, above all, on the subject of functional and organofunctional disorders that biliary radiomanometry has been able to throw new light. Before its advent, biliary dyskinesias, functional or organofunctional disorders, were certainly suspected but without precise data, and simple cholangiography did not make it possible to judge them so accurately.

Biliary radiomanometry has enabled removal of various syndromes from the very wide category of chronic noncalculous cholecystitis in which they were often placed erroneously.

EARL O. LATIMER, M.D.

Secondary Operations on the Biliary Tract. C. P. SCHLICKE. *Am. J. Surg.*, 1953, 85: 754.

It is believed that gastrointestinal tumors in the form of true angiomas are rare, but that malformations or defects are common as multiple conditions of the gastrointestinal tract. Some of these widespread anomalies in the alimentary tract are part of generalized vascular dysplasias, of which Osler-Rendu disease is one important specific and recognizable type. The Parkes-Weber-Klippel syndrome is a rarer association.

The diagnostic and therapeutic problems of such conditions deserve wider notice than that at present accorded to them.

This survey of a relatively neglected problem is illustrated by the description of 3 cases of Osler-Rendu disease with gastrointestinal lesions, 1 case of telangiectatic hypertrophy complicated by intestinal lesions, 1 case of multiple ileal angiomatous tumors causing severe bleeding, and 1 lymphangiomatous tumor of the stomach presenting an extreme diagnostic and therapeutic puzzle.

EARL O. LATIMER, M.D.

Pancreatic Cysts—Surgical Treatment Especially by the Use of Internal Drainage: with a Report of 6 Cases. ALEXANDER L. ZAOUSSIS. *Ann. Surg.*, 1953, 138: 13.

Surgical treatment is undoubtedly indicated in every case of proved or suspected pancreatic cyst. Three major surgical procedures (total excision, and external and internal drainage of cysts) are performed. The ideal total excision of the pancreatic cyst is usually not feasible because of technical difficulties. This is true especially in cases of pseudocysts which are adherent to the surrounding structures and contain a thin friable wall. External drainage is still regarded a safe procedure because of its simplicity, short duration, and low mortality; however, this procedure is limited because of persistent pancreatic fistulas and repeated recurrence of the cysts. In order to avoid these complications of external drainage and total excision of pancreatic cysts, it has been suggested that primary internal drainage be introduced as a method of choice. The simplest type of procedure of internal drainage is cystogastrostomy, especially if the approach is made transgastrically. The transgastric approach is usually made through a transverse incision in the anterior gastric wall, and then an incision is made through a simple opening of the area adherent to the posterior gastric wall. The stoma thus constructed should be approximately 4 to 5 cm. in length. Although this procedure has been strongly criticized, only a few actual failures have been reported.

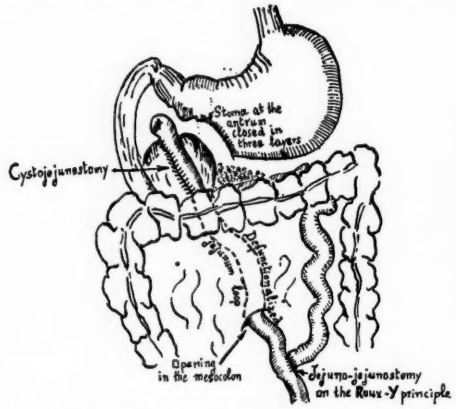


Fig. 1 (Zaoussis). Sketch showing the cystojejunostomy on the Roux-Y principle performed in Case 2, after detachment of the cyst from the pyloric antrum.

Another procedure of internal drainage recommended is the cystojejunostomy with use of the Roux-Y technique (Fig. 1). This has gained popularity and has given excellent results to date. In 1 of the cases reported the Roux-Y technique was successfully used to repair the complete failure of a previous cystogastrostomy which had been performed after marsupialization had failed.

Six cases of pancreatic cysts are reported; in 4 the patients were treated successfully by internal drainage via transgastric cystogastrostomy, without mortality. These patients were followed up for periods ranging from 1 to 3 years.

Internal drainage is suggested as the procedure of choice in the treatment of pancreatic cysts.

JOHN E. KARABIN, M.D.

Operative Technique of Resection of the Head of the Pancreas (Zur operativen Technik der Pankreaskopfresektion). RUDOLPH FELKEL. *Chirurg*, 1953, 24: 358.

In addition to malignant disease of the papilla or the body of the pancreas, the indications for duodenopancreatectomy encompass also carcinoma of the stomach penetrating into the pancreas, islet cell adenomatosis, and painful fibrosis of the pancreas.

The following modification of the modern technique of partial resection of the pancreas, as described by Brunschwig, Priestley, and Cole, was employed by the author in a woman, aged 66, with carcinoma of the head of the pancreas.

The isolated jejunal loop, 30 cm. long, was placed behind the colon (Fig. 1). After implantation of the common duct, the ligature placed around its end was drawn through a temporary jejunostomy performed on the opposite side of the jejunum (Figs. 2 and 3). The site of the pancreatojejunostomy was covered with retroperitoneum (Fig. 4). The author considers this step essential for the prevention of fistula formation. Two-thirds of the stomach was resected.

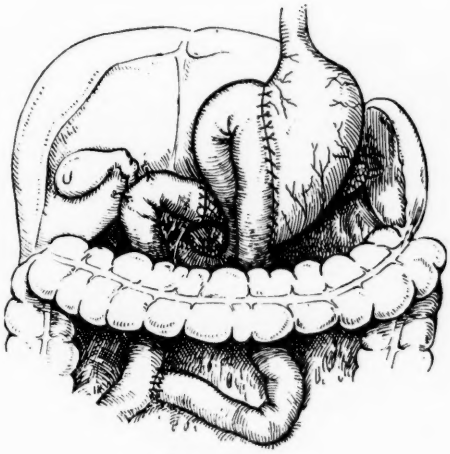


Fig. 1 (Felkel).

After the operation the blood sugar level fluctuated only slightly. Four months after the operation the patient was in good health and showed a gain of 5 pounds.

The author's modification of the customary technique facilitates the creation of an anastomosis without tension, diminishes the danger of descending infection, and reduces interference by reflux of the ingested food with the flow of glandular secretion.

JOSEPH K. NARAT, M.D.

Pancreaticoduodenal Cancer. WILLIAM V. McDERMOTT, JR., and MARSHALL K. BARTLETT. *N. England J. M.*, 1953, 248: 927.

The term pancreaticoduodenal cancer was introduced by Child to characterize a group of malignant tumors that arise in the region of the ampulla of Vater. It therefore includes tumors of the head of the pancreas, the ampulla of Vater, the common bile duct, and the duodenum. All these cancers have in common the fact that a relatively standardized operation, pancreaticoduodenectomy, has been employed in their removal. Carcinomas of the body and tail of the pancreas present a different technical problem and have therefore been excluded from the present study. Because the present study is directed toward the evaluation of long-term results, survival figures have been computed only on patients who left the hospital alive. There were 132 patients with pancreaticoduodenal cancer admitted to the Massachusetts General Hospital in the period from January 1, 1931 through December 31, 1940, and 183 during the decade from January 1, 1941 through December 31, 1950. Eight cases during the entire 20 year period were lost to follow-up study and have not been included in the series; none of these, however, was in the resected group.

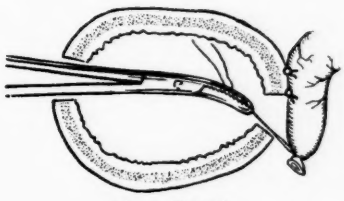


Fig. 2 (Felkel).

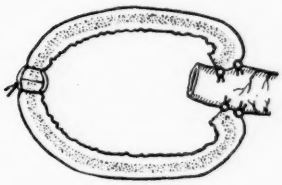


Fig. 3 (Felkel).

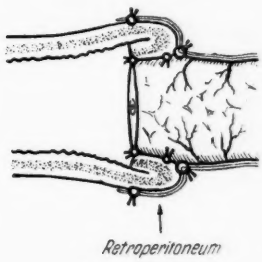


Fig. 4 (Felkel).

Cancer of the head of the pancreas has generally been recognized as being associated with the shortest survival of the entire group of pancreaticoduodenal carcinomas. It is therefore not surprising to find that the average duration of life after pancreaticoduodenectomy was only 11 months. Discouraging as this figure is, it is even more disheartening to find that the average survival of the resected and palliated cases was slightly less than that of a comparable group during the preceding decade when no radical resections were done. There has been no increase in average survival since the addition of radical surgery to previously employed palliative procedures. This suggests that the longer survival in the cases of resection, as compared with the survival in the cases of palliative procedures only, may be attributed to the selection of patients with more favorable tumors for radical surgery. It is fair to say that 2 patients of the entire group were benefited by resection.

Carcinomas of the ampulla of Vater carry a more favorable prognosis than carcinomas originating in the head of the pancreas. The interesting fact derived from these figures is that the average survival in carcinoma of the ampulla of Vater has not been

altered appreciably by the introduction of resection for cure, although in this series, as in other reports, there were a few long survivals after resection. One patient lived more than 5 years and another 4 years after resection. Both died of recurrent disease. None of the patients with cancer of the ampulla of Vater is still alive at present. It is possible to say that "resection for cure" may have extended the survival of a few patients and may achieve isolated 5 year cures. Certainly it has not yet accomplished the results for which one might have hoped.

The relative infrequency of carcinoma of the common bile duct could easily make statistics misleading. Nevertheless, it appears that, like the tumor of the ampulla of Vater, carcinoma of the common bile duct carries a more favorable prognosis than carcinoma of the head of the pancreas, but the average survival has not been increased greatly by the addition of resection. The comments made on carcinoma of the ampulla of Vater are applicable to this group as well. It should be made clear that carcinomas of the gallbladder, common hepatic duct, and biliary radicles are not included for the anatomic location of these structures is such that they do not properly belong under the heading of pancreaticoduodenal tumors.

There is a widespread impression that carcinomas of the duodenum are highly malignant lesions. Obviously, statistical analysis is impossible because of the rarity of this tumor and the small number of cases in this series. The fact that all 6 patients in whom the diagnosis was established between 1941 and 1950 had resectable lesions and that, of these, 2 may well be cured makes it hard to escape the conclusion that these tumors carry a prognosis at least as good as, if not better than, that of any lesion in this series. All the histologic sections were not available for re-examination, but several of these tumors, some of which at least may have arisen from Brunner's glands, appeared to be of low grade malignancy.

There are many possible reasons that could be offered to account for these poor results, but the one most amenable to direct attack is the technique of pancreaticoduodenectomy as it is carried out at present. Any resection for cancer that leaves behind the main venous and lymphatic channels draining the anatomic site of origin of the cancer (in this case, the portal vein and tributaries, and the lymphatics of the gastrohepatic ligament) will obviously fail except in a few isolated cases. For this reason one of the authors, and Child *et al.* have independently reported a method of pancreaticoduodenectomy that includes resection of the portal vein and the accompanying lymphatic system. It will be many years before it will be possible to assess the results of this extension of an already formidable surgical operation. If the physiologic effects of the interruption or shunting of the portal circulation prove unsatisfactory, or if no improvement is apparent in the over-all salvage, consideration should be given to the possibility of abandoning all attempts at radical resection of any but the most favorable of these tumors. EARL O. LATIMER, M.D.

Splenic Cysts, with Report of a Case of a Large Unilocular Cyst of Rapid Growth. RICHARD P. BELL, JR. *Ann. Surg.*, 1953, 137: 781.

Splenic cysts are rare and the author reports the one hundred and eighty-eighth case in the medical literature. This case is exceptional because it was found at laparotomy 6 months after negative palpation during a pelvic operation. This specimen weighed 1,640 gm. and measured 17 by 12 by 16 cm.

Diagnosis is usually made from a history of vague gastrointestinal complaints, the finding of a mass in the left upper quadrant, and a roentgenogram showing displacement of the stomach down and medially, depression of the kidney, splenic flexure, and elevation of the diaphragm.

A classification of true and false cysts is given and the etiology of nonparasitic cysts is discussed.

ERNEST D. BLOOMENTHAL, M.D.

GYNECOLOGY

UTERUS

Carcinoma of the Cervix—An Experience with Surgical Treatment. JOE VINCENT MEIGS. *Ann. Surg.*, 1953, 137: 660.

Meigs, who has long been an exponent of the surgical approach to the treatment of carcinoma of the cervix uteri, presented, in 1951, a group of patients in whom surgical treatment had been accomplished. His "hoped for" 100 cases dwindled, following pathological review, to 85 cases. This current report includes the original 85 cases, and 15 (more recently treated) additional ones to bring the total series to 100. There are 3 patients in the series who lack 2 months of the 5 year follow-up.

The first patient was operated upon in 1939 and the last patient included in the report was operated upon in 1948. The cases were all classed in the League of Nations clinical classification as stage I or stage II. There was a conscious attempt to choose patients whose general health was good and, according to the author, the patients were "good risk, fairly young, and not too fat." There was no primary operative mortality in the entire series. The surgery performed consisted of the Wertheim procedure in conjunction with the Taussig operation for the removal of the pelvic lymph channels and nodes.

Of the 100 patients operated upon, 75 are living and well at 5 years or more after the surgery was performed. There were 66 patients in stage I with a 5 year cure rate of 81.8 per cent. There were 34 patients in stage II with a 5 year cure rate of 61.8 per cent. The patients in stage I with positive nodes had a survival of 41.7 per cent. The patients in stage II with positive nodes had a survival of 9.1 per cent. Total survival in all patients with positive lymph nodes was 26.1 per cent.

There were 46 patients in whom irradiation therapy was used prior to surgery. No cancer was found in the cervix of 21 of these patients. Eighteen of the 21 patients are survivors and 2 of the nonsurvivors had positive nodes. With full radium and x-ray therapy, the cancer was destroyed in 3 of 3 cases; 2 of 3 patients with full radium and no x-ray therapy had a 5 year survival. In 25 patients with less than one-half of the usual irradiation therapy, 12 patients had no tumor in the cervix at the time it was removed.

Ureterovaginal fistulas occurred in 7 patients postoperatively. In 5 instances the fistula healed itself; in 1 case it was necessary to remove a kidney and in the other case a nephrostomy was done. Pyelograms were obtained in 52 patients 5 years or more postoperatively. A normal appearance was noted in 84.6 per cent; the remaining pyelograms showed definite urinary dysfunction.

The author also presents a new classification for the grouping of carcinoma of the cervix, which includes such variables as irradiation therapy, the presence or absence of carcinoma in the surgical specimen, and surgical success or failure.

ARTHUR L. HASKINS, M.D.

Postirradiative Prophylactic Extraperitoneal Lymphadenectomy in Carcinoma of the Uterine Cervix. GUNNAR GORTON. *Acta. radiol.*, Stockh., 1953, Supp. 100.

In an effort to obviate or retard the appearance of late lymph node involvement by malignancy after complete irradiation of uterine cervical cancer, a group of 231 patients in stage I and stage II were considered for a combined therapy program of irradiation and surgery. The plan of treatment was devised after a review of pertinent published data which seemed to indicate that generally irradiation therapy is still the preferred method of treatment of cervical malignancy even though studies have shown that an inadequate amount of irradiation reaches the lymph node regions of the lateral pelvis. The belief that the amount of irradiation reaching the pelvic nodes is below therapeutic levels was further confirmed, in a group of 10 patients in the operative series, by the use of ionization chambers placed at appropriate lymph node areas during the course of the lymphadenectomy. Radium was placed in the vagina and uterus, to carry out this evaluation.

The paths of potential spread of the tumor and the incidence of involved nodes, as mentioned by others, are reviewed in detail. While reports indicate some variation in the incidence of nodal metastases, there seems to be a reduced number of tumor-bearing nodes found in the series of patients receiving irradiation prior to surgery.

With these findings in mind, patients admitted to the Konung Gustaf Jubileumsklinik, Lund, Sweden, were evaluated with a view to combined radiation therapy and extraperitoneal lymphadenectomy. The cervical and parametrial zones were irradiated by two to three intrauterine and intravaginal applications of radium. In the intervals, roentgen and telegamma treatment (Co^{60}) was directed toward the parametrium and lymph nodes.

At first lymphadenectomy was performed as a two-stage procedure, one side at a time, 4 to 8 weeks after completing roentgen therapy. Since local recurrences were frequent, it was decided to perform surgery at a single operation, 4 months after the irradiation. The majority of operations were performed under spinal anesthesia. The operation consists of a bilateral incision from the region of the anterior superior iliac spine to a point 3 to 4 cm. superior to the inguinal ligament. The external oblique fascia is split, the internal oblique and trans-

verse muscles are cut across, and the peritoneum is displaced medially to expose the ureter and pelvic blood vessels with their adjacent lymph nodes. The lymphatic and fatty tissues are removed up to the level of the aorta and vena cava from the lateral pelvic walls. The lowest levels of dissection are marked by the inguinal ligament, the obturator fossa, and the perivesical structures.

Of the 231 patients examined with a view toward treatment, 181 were selected for surgery after the completion of irradiation. Fifty patients were not operated upon for various reasons including refusal by the patient, severe pelvic infections, medical contraindications, and age over 70. Four of the 181 patients receiving surgical treatment were found to have inextirpable node involvement. Fifteen were operated on for local recurrence or radioresistant tumor. All of these patients were subjected to radical surgery according to the technique described by Meigs. There remained 162 patients who had an extraperitoneal lymphadenectomy following irradiation. Twenty (12.3%) of these 162 patients were found to have cancer in the lymph nodes. Four of the 15 patients subjected to radical surgery also had positive nodes. Together with those nodes that could not be removed, there was a 15.5 per cent incidence of lymph node involvement in the 181 patients. When considered by stage, there was a 9.8 per cent incidence of positive nodes in 51 stage I cases and a 17.7 per cent incidence in 130 stage II cases. Although the lymphadenectomy was attempted in several stage III cases, the results are not presented since it was found that tissue alterations made it impossible to excise the nodes and the cases had to be classed as technically inoperable.

In performing the surgery there was no operative mortality. There were several immediate complications: phlebothrombosis, 1 case; postoperative cardiac infarction, 1 case; wound infection, 1 case; hematoma, 2 cases. In 3 cases large vessels were accidentally opened and bleeding had to be controlled by packing. The late complications consisted of: lymphedema in the legs, 22 cases; phlebothrombosis, 1 case; and incisional hernia, 1 case.

All patients were followed from 1 to 4 years. Success to date was judged upon two criteria: first, freedom from subsequent painful involvement of pelvic lymph nodes, and second, improvement upon the results achievable by irradiation alone. Of the 20 patients with lymph node involvement, in whom the lesions were diagnosed microscopically after extraperitoneal lymphadenectomy, 12 are still living with no evidence of the disease. By years of survival, these may be listed as: 4 years, 2 out of 4 patients; 3 years, 1 out of 4 patients; 2 years, both patients who were treated; 1 year, 7 out of 10 patients. Fifteen patients, of the 142 who had no microscopic signs of lymph node metastases, have died since operation; 4 patients died of local recurrence and 9 died of remote metastases.

Results from the combined methods of therapy are compared in detailed tabular form with those of the same clinic for the years from 1943 to 1947 when radiation alone was employed. There is a definite suggestion of improvement in results. As an example, the 4 year cure rate for 1948 is 12 per cent higher than for a comparable group of patients in 1945.

The tabular analysis is presented in such small groups, on the 1 to 4 year basis, that it is difficult to assess the results as yet, and final evaluation will depend upon the collection of 5 year data for the entire 162 patients. The results are believed to be encouraging enough to warrant continuation of this combined procedure in which the inadequately irradiated tissues were removed by surgical technique. It was considered that the best results would be obtained through co-ordination of the methods of therapy and by individualization of each case under the management of one individual.

GEORGE LEWIS, JR., M.D.

Avoidance of Injuries of the Intestines During Intravaginal Irradiation of Carcinoma of the Cervix (Zur Vermeidung von Darmschaeden bei der intravaginalen Bestrahlung des Kollumkarzinoms). W. HEYDE and H. J. SCHMERMUND. *Geburtsh. & Frauenh.*, 1953, 13: 392.

Intravaginal x-ray therapy of the cervix has not become popular because the danger of damage to the adjacent organs cannot be underestimated. The employment of a special hollow anode tube reduces the danger of injury to the rectum or the urinary bladder. On the other hand, the harmful effect of intravaginal radium or roentgen therapy on more proximal segments of the intestinal tract may be considerable and occurs frequently. The authors repeatedly observed edema of the mucous membrane and relative stenosis of the sigmoid. Although such lesions may remain asymptomatic, they are detectable in roentgenograms. Occasionally, complete stenosis of the sigmoid, attributable to the x-ray therapy and not to radium, may be observed.

Loops of intestines, not infrequently located in the left half of the lesser pelvis behind the ligamentum latum, in Douglas' space or in the excavatio vesicouterina, are particularly exposed to the danger of injury from x-rays. Such intestinal segments usually belong to the descending colon or the upper and middle portions of the sigmoid. Postoperative adhesions or inflammatory processes of the involved intestines or of the female adnexa contribute to immobilization of the gut. In the presence of diverticulosis even relatively small x-ray doses are apt to produce serious lesions.

The authors conclude that the condition and location of the lower intestines should be routinely studied after the administration of a barium enema, before intravaginal roentgentherapy is instituted. If adherent loops are demonstrated, one should abstain from excessively distending the vagina in the longitudinal direction before application of the radium, and the necessary radium dose should be spread over a relatively long period of time.

JOSEPH K. NARAT, M.D.

Endometrial Cancer and Feminizing Tumors of the Ovaries; Significance of Their Coexistence. LUDWIG A. EMGE. *Obst. & Gyn.*, 1953, 1: 511.

A high index of correlation has been reported (Dockerty and Mussey; Ingram and Novak) between feminizing mesenchymomas of the ovary and coexisting endometrial carcinoma. This incidence is said to approximate 15 per cent, and in postmenopausal women it may be as high as 27 per cent. Since these tumors secrete estrogen, this correlation has lent credence to the conjecture that estrogens may be carcinogenic in the human female. One of the obvious hazards in the study of the coincident occurrence of these two carcinomas has been the pathologic diagnosis of the existing endometrial disease because of the ease of confusion of certain atypical types of endometrial hyperplasia with endometrial carcinoma.

In reviewing 29 granulosa cell tumors and 14 thecomas of the ovary, listed in the files of the Stanford Gynecological Laboratory and in the Department of Pathology of Children's Hospital of San Francisco, not a single case of endometrial cancer was found. On the basis of the previously cited reports, the expected incidence in this series was 10 cases of endometrial carcinoma. Because of this finding the author sought other sources of information. He presents tables listing 40 teaching centers in the United States and Canada which responded to his inquiries with numerical information concerning the coexistence of feminizing ovarian tumors and endometrial carcinoma.

Twenty-four sources, with a total of 398 granulosa cell tumors of the ovary, list no cases of coexisting endometrial carcinoma; 16 sources, with a total of 249 cases of granulosa cell tumors of the ovary, indicate a coexisting endometrial carcinoma in 20 instances; 18 sources, with a total of 106 theca cell tumors, indicated coexisting endometrial carcinoma in 5 cases. A total of these reports indicates that there were 25 endometrial carcinomas associated with 753 feminizing ovarian tumors. A study of 1,990 patients with endometrial carcinoma revealed 6 cases of concurrent feminizing ovarian mesenchymomas, an incidence of 0.34 per cent.

In conclusion, extensive sampling at widely separated sources does not confirm previous reports that a high incidence of endometrial carcinoma is attendant with feminizing ovarian tumors; therefore the phenomenon is inconstant and does not prove that endogenous estrogen is a carcinogenic agent in the human female. ARTHUR L. HASKINS, M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

Right Upper Quadrant Pain in Salpingitis and Other Abdominal Diseases Explained by Absorption of Exudates from the Peritoneal Cavity Through the Diaphragm. POVL HOLM-NIELSEN. *Acta chir. scand.*, 1953, 104: 435.

Right upper quadrant pain, which may occur in the presence of salpingitis and other abdominal diseases, or after laparotomy, constitutes a well defined syndrome with an unequivocally verified pathoanatomical basis, viz., an affection of the serous membrane of the right subphrenic space, which results from an accumulation of exudates from the peritoneal cavity through the diaphragm.

In about 10 per cent of all cases of salpingitis, a characteristic piercing upper abdominal pain occurs, usually localized to the region below the right costal margin. The pathoanatomical basis of this pain is an affection of the serous membrane of the right subphrenic space (perihepatitis).

Autopsy studies, notably of cases of peritonitis and peritoneal carcinomatosis, lend support to the view that the absorption of exudates and cell from the peritoneal cavity in man occurs principally through the lymphatics in the diaphragm, just as has previously been shown in animals. Hence, it is natural to explain the affection of the serous membrane of the subphrenic space and the attendant right upper quadrant pain in salpingitis as a consequence of the absorption of exudates through the diaphragm.

The same typical pain may occur also in other abdominal diseases which are accompanied by exudation into the peritoneal cavity, and after laparotomy. Most frequently, this pain is interpreted as being produced by quite different diseases; particularly, the differential diagnosis of right upper quadrant pain from pulmonary infarct is discussed.

JOHN R. WOLFF, M.D.

Polyethylene Intubated Salpingoplasty. MARIO A. CASTALLO and AMOS S. WAINER. *Am. J. Obst. Gyn.*, 1953, 66: 385.

In a short review of all publications concerning the problem of sterility due to occluded tubes, the authors express the view that surgical procedures in these cases had such poor results so far that most gynecologists have gradually discarded them. However, as the growth tendency of the tubes is so great that recanalization can occur even after gonorrheal pelvic inflammatory disease and occasionally even after surgical tying of the tubes, the authors experimented on a procedure to assist this natural process with a "splint."

Previous animal experiments with Macaca rhesus gave satisfactory results with polyethylene tubing and have been reported elsewhere. In this article 170 cases of recanalization of the tubes with the assistance of polyethylene tubing done by 24 operators are discussed. The combined results amount to a cure rate (with resulting pregnancy) of 17 per cent, while 53.5 per cent of the tubes could be opened permanently.

Under ideal conditions complete sterility studies including hysterosalpingography should be done to ascertain the point of stenosis before surgery is attempted. In occlusion of the cornual end, excision of this area is followed by insertion of polyethylene tubing from the fimbrial end right through to the cervix. In occlusion of the fimbrial end an umbrella-

like plastic structure protects the operative site from postoperative adhesions; this must be removed later by a second abdominal operation. Stenosis in the midportion of the tube is excised, bridged by tubing and left unsutured for regeneration. This tube can be implanted in the anterior abdominal fascia and later removed under local anesthesia. Ideally, tubing should be removed after 8 weeks, and then the patency of the tubes should be checked with repeated Rubin tests.

The number of cases reported and the short time elapsed since the first operations (1 year) to publication of this article are not yet sufficient to take this method out of the experimental stage.

W. D. BERGMAN, M.D.

MISCELLANEOUS

Experimental Studies on the Bisexual Hormonal Activities of Cholesterol, Testosterone Propionate, Androstendiol Dipropionate, and Dehydroandrosterone (Studio sperimentale sull'attività ormonica bisessuale della colesterina, del testosterone propionato, dell'androstendiolo dipropionato e del deidroandrosterone). F. DESTRO. *Ann. ostet. gin.*, 1953, 75: 149.

The author has studied the biological effects of the administration of cholesterol, testosterone propionate, androstendiol dipropionate, and dehydroandrosterone on prepuberal rats and hypophysectomized rats. He concludes that these agents have a bisexual effect and that their chief action on the female genital tract of the rat is that of a follicular agent and secondarily that of a luteinizing agent. Dehydroandrosterone and androstendiol showed this effect most markedly, while testosterone seemed to have a major follicular effect.

GEORGE L. NARDI, M.D.

Bacteroides Infections in Obstetrics and Gynecology. BAYARD CARTER, CLAUDIUS P. JONES, ROBERT L. ALTER, ROBERT N. CREADICK, and WALTER L. THOMAS. *Obst. & Gyn.*, 1953, 1: 491.

In 1951 the authors published the bacteriologic findings in 133 patients with pyometra. Mixed anaerobic infections which included bacilli belonging to the genus Bacteroides were found in 41 of these patients. Subsequent reports by other observers, indicating a high incidence of Bacteroides infection in other gynecologic disease, prompted the authors to evaluate their own material further. This article is concerned with the bacteriologic findings in 153 patients treated in the Obstetrics and Gynecologic Department of Duke Hospital, from whom various species of Bacteroides were isolated.

The historical aspects of the isolation and the occurrence of Bacteroides are reviewed. After considering the several taxonomic methods, the authors conclude that the Bacteroides are a heterogenous group of gram negative, nonsporulating, anaerobic bacilli about which little is known which would allow practical identification of the species.

In this group of 153 patients, pure cultures of Bacteroides were obtained from 12 patients, and in 78 others nonsporulating anaerobic bacteria other than Bacteroides were found in association with this organism. The most commonly occurring association was a combination of Bacteroides and anaerobic cocci. This combination was noted in 49 cultures. The most commonly occurring cocci was the anaerobic streptococci.

There were 57 patients with pelvic malignancy, in whom Bacteroides infection complicated the primary disease. There were 6 deaths in this group of patients. While not suggesting that the Bacteroides infection was the cause of death in these 6 patients, the authors consider the infection to be a real contributory cause of death in this group.

The Bacteroides were also found in pyometra without malignancy and in Bartholin abscesses, as well as in abscesses located elsewhere in the reproductive tract. There were 16 patients in whom pregnancy was associated with Bacteroides infection. Of this group, 3 died—2 of postabortal infections and 1 of septicemia following an intra-abdominal pregnancy. The article contains 15 case reports.

A. L. HASKINS, M.D.

Endometriosis of the Pelvis. Clinical Contribution to the Histopathogenetic Theory of Sampson (Endoimetriosi pelvica: contributo clinico alla teoria istopatogenetica di Sampson). GIOVANNI GARRONE. *Minerva gin.*, Tor., 1953, 5: 119.

A 40 year old married woman had had two normal deliveries; however, after the second delivery the puerperium was complicated by metrorrhea which required curettement. Following this operation menstruation ceased entirely and the patient began to suffer pains in the lower abdomen of increasing intensity and frequency. In about 9 months the pain had become practically continuous, intense attacks alternating with periods of relative well-being. At the time of admittance the patient was emaciated and appeared much weakened.

Two tumors were located by abdominal and gynecologic palpation. The one on the left side, about the size of an orange, was adherent to the uterus which it had pushed forward and to the right. The one on the right side was smaller, but appeared to be firmly adherent to the pelvic wall.

At operation a difficult bilateral adnexectomy with subtotal hysterectomy was carried out. Both tubes and the uterus were found, histologically, to be free of endometriosic invasion; however, the two ovaries were found to be in a state of advanced sclerosis—only tiny islets of ovarian tissue remained. The two tumors were composed, in addition to the extreme degree of sclerosis, of numerous typical endometriosic glandular structures. The general impression was that the endometriosic process had become encapsulated and practically suppressed by the huge connective tissue proliferation.

Most interesting, however, were the findings in the uterus. There was complete atresia of the uterine

cavity, with a small portion of the uterine lumen above the place of atresia. In this portion of the uterine lumen a small hematometra had developed. In the author's opinion this hematometra explained the colicky pains, rather than the endometriosic tumors themselves, the periods of well-being corresponding to the periods when the excess blood (gathering as a result of the menstrual periods) had spilled out through the faliopian tubes into the peritoneal cavity.

Thus, the author regards the case reported to be a powerful substantiation of the histopathogenetic theory of Sampson. In this instance the atresia of the uterine lumen forced the evacuation of the menstrual blood through the fallopian tubes in a reflux direction. This reflux stream of the menstrual blood collected above the point of narrowing and carried with it endometrial elements which then became implanted in the ovaries and the broad ligament to form the sclerotic ovaries and the described tumors.

The author believes (and his belief is largely substantiated by the literature) that the proliferative phase of endometriosis of the pelvis is maintained by the ovarian hormones. The quiescent, sclerotic impression given at operation by this patient can therefore be explained on the basis of failure of the ovarian hormones. This failure may in turn be explained as due to the age of the patient who was in the menopause or to the sclerotic mutation of the ovaries. JOHN W. BRENNAN, M.D.

Endometriosis; Etiologic Role of Marriage, Age, and Parity. Conservative Treatment. JOE VINCENT MEIGS. *Obst. & Gyn.*, 1953, 2: 46.

The author states that although early marriage and frequent child-bearing have not been conclusively demonstrated to be important preventive factors of endometriosis, the facts presented here seem to suggest that the idea deserves serious consideration. The author reports on the conservative treatment of endometriosis. He believes that in addition to treatment, either medical or surgical, prophylaxis should play an important part in therapy.

A discussion of the definition, etiology, prophylaxis, and treatment is given. The author states that the best medical treatment is pregnancy. He believes that if surgery is resorted to, it should be conservative, if possible.

There is a marked difference in the occurrence of the condition in private and ward cases. The private patients usually marry late and avoid pregnancy; they have fewer children and from six to seven times as much endometriosis.

BYFORD F. HESKETT, M.D.

Suburethral Fibromas in Women (Les fibromes sous-urétraux chez la femme). P. FUNCK-BRENTANO, H. ROBERT, and BALZA GUILLERMO. *Gyn. obst.*, Par., 1953, 52: 12.

Suburethral fibromas in women are histologically benign, but may lead to grave complications such as hemorrhage, infection, or malignant degeneration. The tumors may remain unnoticed for a long time. After having attained a certain size, they begin causing discomfort, sensation of heaviness, pain, leucorrhea, urinary disturbances, vaginal bleeding, or uterine reflexes. They may reach the size of a small orange.

The tumors consist of connective tissue and muscular fibers and are very vascular, especially during pregnancy.

The etiology and pathogenesis of suburethral fibromas remain obscure. Trauma and infection are considered causative factors by some authors. There is no unanimity of opinion on the question whether the tumors are of urethral, uterine, vaginal, or embryonic origin.

It is important to establish an early diagnosis. Although, according to some authors, roentgen and radium therapy give satisfactory results, excision remains the method of choice.

Following an abortion, a globular tumor the size of a tangerine was found in front of the upper portion of the vagina in a woman aged 36. A tentative diagnosis of hematocele was made. Exploratory laparotomy revealed a subperitoneal tumor which was subsequently removed through the vaginal approach. The histologic examination established the diagnosis of suburethral fibroma.

JOSEPH K. NARAT, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Pelvic Deformities of Grade I, at the Obstetric Clinic of Bologna, Italy, from 1937 to 1951 (I vizi pelvici di 1° grado nella Clinica Ostetrica di Bologna—1937–1951). CORRADO BELVEDERI and LUIGI BARTOLOTTI. *Ann. ostet. gin.*, 1952, 74: 919.

Since pelvic deformities other than the simple or rachitic, flat pelvis are too infrequently encountered to seriously affect the statistical conclusions arrived at in a given series of cases, the authors have devoted the greater part of their attention to the measurements given for the conjugata vera (c.v.). Thus, in a series of 26,637 childbirths they found 2,282 (8.56%) patients with a c.v. of 8 to 10 cm. This material comprises the grade I deformity discussed, and represents the limits within which spontaneous delivery can be expected to take place.

The authors reject the idea of a dogmatic arithmetical lower limit to the c.v., such as the 9 cm. limit of some authors; they believe that the lower limit for the measurement of the c.v. is a flexible one, a sort of dynamic phenomenon on the part of the mother in relation to a plastic one on the part of the fetus. For convenience of discussion, this entire series of 2,282 pathologic pelves is subdivided into groups: 33 cases (1.45%) with c.v. of 8 to 8.5 cm., 156 cases (6.84%) with c.v. of 8.6 to 9 cm., 800 cases (35.05%) with c.v. of 9.1 to 9.5 cm., and 1,293 cases (56.66%) with a c.v. of 9.6 to 10 cm.

Thus, of the 1,016 primiparas (44.52%), the instances, respectively, of each of the 4 groups enumerated herein consisted of 14, 65, 371, and 566; the 680 secundiparas (29.80%) consisted, respectively, of 16, 48, 238, and 378; the 278 tertiparas (12.18%) numbered, for the respective groups, 0, 21, 90, and 167; the 308 pleuriparas (13.50%) afforded the respective numbers of 3, 22, 101, and 182. Thus, the authors do not attribute any particular importance to parity in the matter of dystocias resulting from the flat pelvis. An odd incidence encountered was the tendency of the weight of the fetus to become less as the pelvic narrowing assumed a more serious character; however, the authors attribute this discrepancy from the normal to the fact that the mother herself, with the flat pelvis, is small and not too well developed.

Other conclusions from this vast statistical material are such as one would expect, or are easily explainable. Most striking has been the drop in both fetal and maternal mortality since the advent of the antibiotics. In fact, the fetal mortality in this series is not remarkably higher (7.09%) than that reported by Belvederi and Gianaroli from this same clinic for the births in patients with normal pelves. Of the mothers with deformed pelves (2,282 cases), 2,063 (90.40%) underwent a perfectly normal puerperium. There were 18 maternal deaths, 47 febrile puerpera (2.56%) among the spontaneous deliveries, and 52 febrile puerpera (11.53%) among the artificial deliveries. The mortality and morbidity in this series have progressively diminished with the years.

At present there is no need to endanger the life of the child in order to safeguard the life of the mother. The progress observed in the past few years leads the authors to conclude that the postulate aimed at (i.e., the life of the mother and that of the child should be equally safeguarded), if not fully attained, will nevertheless be closely approximated.

JOHN W. BRENNAN, M.D.

Anticoagulant Therapy in the Toxemias of Pregnancy; Clinical and Experimental Contribution (La terapia anticoagulante nelle tossiemie gravidiche; contributo clinico e sperimentale). ITALO PANELLA. *Riv. ital. gin.*, 1953, 36: 38.

Fifteen cases of toxemia of pregnancy treated with anticoagulants (heparin), are reported. Seven of the patients were eclamptics and 8 were preeclamptics. These cases date back to 1948. The patients selected for treatment with heparin were those with toxemias, particularly eclamptics, without evidence of cardiac or hepatic lesions, without fever, and in whom tests showed increased coagulability and decreased hemorrhagic tendencies of the blood; that is, there was evidence of increased viscosity and increased difficulty of blood flow.

The material comprised young women between the ages of 19 and 35. Only 3 exceeded 35 years of age and in these the maximum age was 40 years. Twelve of these patients were in the ninth month of pregnancy or were at term; of the remaining 3 patients, 2 were in the eighth month and the other was at the end of the sixth month of pregnancy. All of these women were suffering from a severe form of toxemia of pregnancy with an albuminura of more than 2 pro mille, cylindruria, marked edema, and hypertension of more than 150 mm. Hg. In nearly every instance the blood pressure was in the neighborhood of 200 mm. Hg., and in every patient there was an oliguria in consonance with the degree of involvement of the kidney.

Of the eclamptic patients, 3 had experienced 10 or more convulsive attacks; in the others the attacks varied from 2 to 5. The dosages of heparin administered to the patients of this group were never excessive (minimum 80 mgm., maximum 140 mgm.). Contemporaneous sedative and detoxication measures were administered. All 7 of these eclamptic patients delivered living children spontaneously and were discharged in good health in from 6 to 20 days post partum. In 2 of these patients, delivery was induced and in 2 it was accelerated. In these cases, even considering the improvement to be expected from the treatment, and the anticipated benefit to the patient on being relieved of the preg-

nancy (in comparison with the numerous other cases in which such anticoagulant therapy was not administered), improvement could be detected from this latter form of treatment, both in the behavior of the tests for coagulability of the blood and in the improvement of the symptomatology. The heparin seemed to produce a disappearance of the convulsive seizures, lowering of the blood pressure, increase in the urinary secretion, and improvement in the mental state of the patient.

In the pre-eclamptic patients, the heparin was administered during the course of the pregnancy, in much the same manner as in the eclamptic patients; however, in some cases a larger number of injections were necessary—in one instance, more than 10 (maximum total dosage, 440 mgm.). The best proof of benefit from the injections of heparin was the observation of a drop in the blood pressure consonant with the lengthening of the bleeding time, and the decrease in coagulability of the blood itself. In nearly every instance there was a decrease of 20 to 30 mm. Hg. in the blood pressure—abolition of the "sludging" of the blood (KNISELY and COLL. *Arch. Surg.*, 1945, 51: 220). This process has been subjected to extensive study by Schneider (*Surg. Gyn. Obst.*, 1950, 90: 613).

On the whole, the author rejects the use of dicumarol in the treatment of the toxemias of pregnancy, both because of its proved harmfulness in regard to the offspring in experimental animals, and because of the continual disapproval with reference to its use in this condition to be found in the literature. However, he thinks that an especially pure form of heparin, in small and broken doses, has a definite place in the treatment of the toxemias of pregnancy. JOHN W. BRENNAN, M.D.

Attempts at an Enzymatic Therapy (Hyaluronidase) of the Toxicoses of Pregnancy [(Tentativi di terapia enzimatica (ialuronidasi) della tossicosi gravidica)]. C. PELLIZZARI. *Riv. ital. gin.*, 1953, 36: 85.

Ten patients with various severe manifestations of the toxicoses of pregnancy were treated with intramuscular injections of 2,000 to 4,000 (usually 3,000) U.V. of hyaluronidase.

In all these patients, following the injection of hyaluronidase there developed a noticeable increase in the amount of albumin in relation to that of globulin; there was constantly a marked increase in the amount of blood and urinary chlorides (notably lowered in the toxicoses). Following the injection, Quick's test showed a constant lengthening of the bleeding time. This result of the test of Quick would, of course, indicate a diminution in the coagulability of the blood, and it is used by the author to explain his observation of the greater amount of bleeding in these patients with extrusion of the placenta.

Clinically, following the injection of hyaluronidase, there was a rather prompt amelioration of all manifestations such as coma, headaches, edema, hypertension and convulsions.

In a particularly severe instance of eclampsia, the 26 year old patient entered the clinic with grave eclamptic manifestations, such as convulsions, diffuse edema, clouded consciousness, and hypertension. She was in labor and the child was delivered by forceps. The eclamptic state continued into the puerperium and the convulsions became continuous. Hyaluronidase (3,000 U.V.) was injected intramuscularly. Following this treatment the hypertension, the comatose state, and the convulsions disappeared, and within a few days the patient made a complete recovery and was able to leave the clinic.

The author believes that evidence of the value of hyaluronidase in the treatment of the toxicoses is sufficient to encourage further efforts in this direction. JOHN W. BRENNAN, M.D.

Extensive Bilateral Nephrolithiasis and Gravidity (Ausgedehnte doppelseitige Nephrolithiasis und Graviditaet). H. MEUSER. *Wiener med. Wschr.*, 1953, 103: 260.

A woman 36 years of age was admitted to the hospital in the fifth month of pregnancy for severe bilateral pyelonephritis. Roentgen examination showed extensive nephrolithiasis of both kidneys, the intravenous urogram showed considerable renal damage, and the nonprotein nitrogen was 38 mgm. per cent. Bacteriologic examination showed mixed infection of Staphylococcus pyogenes aureus and Bacterium coli. After sensitivity tests were performed, the patient was treated with chloromycetin and terramycin—100 gm. of chloromycetin and 50 gm. of terramycin up to the time of delivery.

The results of this treatment were excellent. The infection was controlled, the kidney function and the severe anemia improved, and the patient had a normal spontaneous delivery at term.

Six weeks after delivery the concrements were removed from the right kidney by pyelonephrotomy; 17 days later the same operation was performed on the left kidney, but a severe postoperative hemorrhage necessitated removal of that kidney.

The author emphasizes the importance of judicious antibiotic therapy and careful sensitivity tests in these cases. Before the era of antibiotics a pregnancy such as this would have had to be interrupted. By energetic, continuous antibiotic treatment it was possible to carry the patient through the pregnancy and to postpone the necessary surgery until after delivery. WERNER M. SOLMITZ, M.D.

PUERPERIUM AND ITS COMPLICATIONS

Twenty Years of Experience in Manual Removal of the Placenta at the Obstetrical and Gynecological Clinic of L. Mangiagalli; Clinicostatistical Report (La pratica del secondamento manuale, durante un Ventennio, presso la Clinica Ostetrica e Ginecologica, "L. Mangiagalli"; rilievi clinico-statistici). I. VANDELLI and A. GIACOMELLI. *Ann. ostet. gin.*, 1952, 74: 452.

Manual removal of the placenta was done in 337 (0.53%) of 63,422 deliveries during the period from

1931 to 1950, at the Clinic of the University of Milano, Italy. The incidence, however, has risen from 0.60 per cent in 1931 to 1.05 per cent in 1950. This increase is ascribed to the fact that the obstetrician has felt more free to resort to the maneuver, in view of the protection afforded by the antibiotics; in fact, no death from puerperal sepsis has been reported since 1942, when the first of the sulfonamides became available. There were 15 deaths; however, 5 of these (1 case of cardiopathy, 1 case of ruptured uterus, 2 cases of eclampsia, 1 case of tuberculosis) were not related to the operation; 4 patients with acute anemia had already suffered fatal hemorrhages before the operation was attempted. Thus the uncorrected mortality was 4.45 per cent and the corrected, 1.78 per cent.

The authors believe that the practice of manual removal of the placenta should undergo a thorough review without influence from the precepts of some of the older authors who have pronounced the procedure an extremely dangerous one. They are not in complete accord with the extremely interventionistic attitude of Gheorghiu (among others), who suggested routine manual revision of the uterus after every childbirth; however, they consider that it is hardly sensible to wait for delivery of the placenta until the cervix has contracted down and will have to be dilated again. Neither do they consider it good practice to delay while the patient is bleeding, and especially since it is impossible to judge the amount that the parturient may be allowed to bleed without danger of damage. This amount seems to vary from case to case.

When the obstetrician has waited for the spontaneous discharge of the placenta for 30 to 45 minutes, it is then useless to attempt a Credè expression; with this method it is easy to produce an inversion of the uterus or to actually increase the hemorrhage, rendering more difficult the manual removal or, indeed, any other operative act calculated to control the hemorrhage.

JOHN W. BRENNAN, M.D.

MISCELLANEOUS

Measurement of Uterine Blood Flow and Uterine Metabolism. Critical Review of Methods. N. S. ASSALI. *Am. J. Obst. Gyn.*, 1953, 66: 3.

There is a very little in the past literature concerning the uterine blood flow in either the pregnant or nonpregnant state. This has been due to inaccuracy of the methods previously used. However, two new techniques have been developed for determination of the blood flow to the brain, and these have been found to be applicable to the uterine blood flow as well.

The first technique is that for nitrous oxide devised by Kety and, in spite of several errors inherent in the technique, it is believed that the results give a close approximation of the true picture. The dye technique using T-1824, developed by Stewart, is subject to some errors, but since the dye does not cross the placental barrier, the combination of the two techniques should yield fairly accurate information concerning the uterine blood flow during pregnancy.

JAMES F. DONNELLY, M.D.

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Diagnosis of Hypertension Caused by Pheochromocytoma, with Remarks on the Use of Regitin for Diagnostic and Intraoperative Purposes (Zur Diagnostik des Phaeochromocytom-Dauerhochdruckes mit Bemerkungen zur diagnostischen und intraoperativen Verwendung des Regitins). J. M. BAYER and H. ODENTHAL. *Langenbecks Arch. u. Deut. Zschr.*, 1953, 274: 406.

Characteristic paroxysmal hypertensive attacks with intervening periods of normal blood pressure are rarer than paroxysmal hypertensive bouts alternating with a continuous moderate elevation of the blood pressure. Hypertensive crises make the diagnosis easier, whereas in their absence the condition may resemble essential or renal hypertension. It is especially difficult to diagnose the "masked" cases and it is estimated that 600 to 800 patients die annually in the United States from unrecognized pheochromocytoma. Palpation of a tumor may permit the diagnosis of cases with stable hypertension (Rehn, Jr., and Roesch; Becker). The authors report 2 cases.

Case 1. A 41 year old male suffered since 1936 from duodenal ulcer and had questionable cholecystitis in 1949. In March, 1951 he was admitted because of pains in the right and middle epigastric region. An unsatisfactory cholecystogram was obtained. After 2 weeks of observation the previously normal blood pressure rose to 230/120 mm. Hg. This blood pressure became a labile yet permanent condition, ranging systolically from 270 to 140 and diastolically from 160 to 100 mm. Hg. The diastolic value dropped only twice. There was bradycardia. The additional history disclosed profuse perspiration at work and at rest, vertigo during heavy labor since 1950, continuous discomfort in the left hypochondrium with radiating palpitation and sensation of warmth to the left of the sternum and to the left half of the skull excruciating headache only on the left side and occasional pain in the right cubital fossa. Duration of the attack lasted 5 to 10 minutes; it was provoked by physical or mental stress. The discomfort on the right side disappeared completely during further observation. Massage of the kidney region or intravenous histamine injection did not precipitate an attack. The benzodioxane test was negative. The regitin test with 10 mgm. given intramuscularly was negative, but positive in the same dosage after intravenous administration, the blood pressure being lowered 40/35 mm. Hg. Ophthalmoscopically there were narrowing and irregularities of the arteries. Perirenal air insufflation and an intravenous urogram showed that the left adrenal gland, though not positively enlarged, was yet of a vacuolic structure. In July, 1951 transperitoneal operation was done after premedication with 10 mgm. of regitin.

Prior to manipulation of the tumor the pressure rose from 150/90 to 225/150 and during dissection to 260/90 but dropped after ligation of the vessels to 85/0. Five per cent dextrose solution with 4 c.c. of suprarenin/1,000 c.c. and two additional injections of 0.5 c.c. of suprarenin within the first postoperative hour in conjunction with 50 mgm. of percorten controlled the drop in blood pressure. For 2 days the 5 per cent glucose infusion was continued with 8 c.c. of suprarenin/1,000 c.c. The administration of 20 mgm. of percorten twice a day was discontinued on the fourth postoperative day, and the patient was discharged after uneventful recovery on the sixteenth postoperative day. The tumor which measured 3.8 by 3.1 by 2.5 cm. was histologically a benign pheochromocytoma and contained 11 per cent adrenalin and 89 per cent arterenol. Follow-up study 1 year later showed that the blood pressure was 110/70; the ophthalmoscopic findings were normal and there were no subjective complaints.

Case 2. A 30 year old patient had been buried under an earth mound by a grenade blast in 1944, and was unconscious for 10 days. He was released as a prisoner of war in 1945. Ever since that time he felt fatigued and suffered from vertigo with three episodes of syncope for 1 to 2 minutes. Flushing of his face, palpitations, tinnitus, facial pallor, perspiration, coldness of the fingers, and occasional severe headache were observed. His condition was worse on rising in the morning, but mental and physical stress also precipitated attacks. There was a tendency toward spasms in his calves and toes, and he complained of marked thirst. He was admitted in July, 1952. He had continuous rhythmic changes of blood pressure alternating within 3 to 5 minutes between normal and moderately elevated values and concomitant tachycardia and bradycardia, respectively. He also had a mild diabetic condition as shown by a blood sugar test with double doses of Staub-Traugott. There was a decreased concentration and dilution, as shown by Volhard's test. Perirenal air insufflation and an intravenous urogram disclosed an adrenal tumor of fist size on the right side. Five milligrams of regitin had no effect but 10 mgm. given intravenously gave a positive result. The intravenous administration of 15 mgm. of benzodioxane gave equivocal results. An operation was performed in July, 1952; the retroperitoneal-transdiaphragmatic approach of Nissen was used. Removal of the large tumor was easy. During the intervention 10 mgm. were given 4 times. After ligation of the tumor vessels, blood transfusion, and intravenous administration of 5 per cent glucose solution with 4 c.c. of arterenol, 8 c.c. of suprarenin, and 50 mgm. of percorten per each 1,000 c.c. were done, yet the pressure dropped to 50/0. Continuation of the same therapy stabilized the pressure after 24 hours. Fatigue, paroxysmal attacks, and

carbohydrate tolerance improved postoperatively, whereas the renal dysfunction remained unchanged. The tumor measured 10.5 by 9.0 by 5.0 cm. and was histologically a benign pheochromocytoma weighing 263 gm. Pharmacologically, it contained 0.4 mgm. of adrenalin and 1.5 mgm. of arterenol per 1 gm. of tumor weight, or an adrenalin-arterenol ratio of 21 to 79 per cent.

Both tumors contained arterenol; the first patient had a permanent labile, and the second, a rhythmically fluctuating, hypertension. There were no metabolic changes in the first case as contrasted with diminution of the carbohydrate tolerance in the second case. The regitin test was positive in both; the benzodioxane test was negative in the first case and equivocal in the second. Good operative results were obtained in both cases. The authors then recapitulated at length regarding the symptoms and signs and the differentiation between essential and renal hypertension, and quoted in detail the work of Goldenberg and his associates. The operative prognosis was good, and the angiospastic retinopathy reversible. The development of continuous hypertension from paroxysmal attacks was thought to be caused by changed tumor secretion. Palpable tumors are rare (13%).

In the absence of renal disease and hypertension in children, pheochromocytoma should be suspected. None of the chemical preparations is entirely reliable. The benzodioxane test, if positive in the absence of uremia or intake of sedatives, is proof of a tumor; however, a negative result does not exclude its presence. There is the danger that it may cause a severe increase in blood pressure if hypertension is due to other causes than tumor. Regitin, originally described as effective in an intramuscular dose of 5 mgm., is better when given intravenously in a dose of 10 mgm., provided that the 5 mgm. dose has failed.

The authors question whether a positive regitin result is equivalent to a positive benzodioxane result because they observed a false positive result from 5 mgm. given intravenously in essential hypertension, which could neither be duplicated with 10 mgm. given intravenously the next day nor confirmed with benzodioxane. If the clinical picture is unequivocal, then pharmacological tests are unimportant, but if the clinical picture and the x-ray diagnosis are dubious, then a positive benzodioxane test in conjunction with increased catechol values in the blood or urine indicates exploration. The operation is generally not difficult technically. Dangers of the intervention are increase of the preoperative blood pressure. This is preferably combated with benzodioxane or regitin rather than with dibenamine because of the latter's prolonged action which prevents the effect of agents that increase the blood pressure; which increase is necessary in the collapse period after removal of the tumor. The quality and quantity of the tumor secretion are believed to exert an effect on the contralateral adrenal medulla which in most cases shows compensatory atrophy and thus explains the severe postoperative hypotension. ERNEST BORS, M.D.

An Adrenaline-Producing Tumor Outside of the Adrenal Glands. KARIN WIRD-LÖKK and KARL-GUNNAR TILLINGER. *Acta chir. scand.*, 1953, 104: 458.

Adrenaline-producing tumors (paragangliomas) outside of the adrenal medulla are uncommon, and only about 30 have so far been reported. They are usually found behind the abdominal aorta, and occasionally in the thorax. These tumors are round and encapsulated, and on section are found to be spottily pigmented, often showing cystic degeneration and hemorrhage. The treatment is surgical extirpation.

The authors report a case, from the Centrallasarettet in Eskilstuna, of a 28 year old female suffering from paroxysmal hypertension. A left paraumbilical mass was palpable, which proved on operation to be a grapefruit-sized retroperitoneal paraganglioma. Two years later the tumor was noted to have recurred locally. JOSEPH E. MAURER, M.D.

Hydronephrosis in Children. A Clinical Study of 78 Cases with Special Reference to the Role of Aberrant Renal Vessels and the Results of Conservative Operations. H. H. NIXON. *Brit. J. Surg.*, 1953, 40: 601.

Nixon reports an unselected series of 78 hydronephroses in children of whom 69 had an organic cause of obstruction. In this series, 92 per cent of the children with vessel obstruction had attacks of pain as the presenting symptom, while of those without vessel obstruction only 73 per cent had pain. There was a preponderance of lesions on the left side (58 to 20). The typical clinical picture included attacks of pain in the side, often causing vomiting. Nevertheless, the diagnosis was often delayed because the child was usually seen between the attacks, in good health with no physical signs.

Nixon divided the cases into 3 groups: 25 with an apparently obstructing vessel, 25 with intrinsic stenosis (typically at the upper end of the ureter or extending into the pelviureteric junction itself), and 19 with fixation of the ureter only. The ureter was held against the pelvis during distention, which produced a kinking obstruction of the outlet, and the folds seemed to be derived from the connective tissue cloaking the ureter and pelvis. Evidence of inflammatory reaction was lacking.

Conservative operations tended to relieve pain whether or not the obstruction had been overcome. This is attributable to the relief of acute crises of distention by the operation, rather than to the inadvertent incomplete sympathectomy during clearance of the pelvis. The author found that the chances of successful conservation were doubled when an obstructing vessel was present. He feels that these "obstructive" vessels are secondary, not primary, obstructive factors in a majority of the cases; opinion in the literature concerning this relationship is divided.

Conservative operation is a safe and useful procedure in many cases of hydronephrosis in children; approximately one-third of the patients have retained a useful kidney. The indication for secondary nephrectomy arises after careful postoperative pyelography and surveillance.

DAVID ROSENBLOOM, M.D.

Streptomycin, PAS, and Isoniazid in Renal Tuberculosis. JOHN K. LATTIMER, FRED LERMAN, PHILIP LERMAN, and LOUIS L. SPIVACK. *J. Urol.*, Balt., 1953, 69: 745.

The authors present 458 cases of genitourinary tuberculosis in which treatment with chemotherapy alone was administered over a period of 5 years.

The symptomatic improvement was impressive, although the dull kidney pain frequently suffered by the patient was not relieved. Roentgen evidence showed cavitation to be halted in both the small and massive lesions when judged by several pyelograms. A point made was that intravenous urograms were necessary every 4 months to diagnose strictures. When found, they could be dilated and made to stay open thereafter, even if the urine could not be made sterile. The survival rate among the patients was impressive.

The authors conclude that a 5 year follow-up with bacteriological, symptomatic, x-ray, and survival information justified the chemotherapy.

PAUL R. LEBERMAN, M.D.

Complications Following the Use of Streptomycin and Para-aminosalicylic Acid in Advanced Renal Tuberculosis. S. SCHER. *Brit. J. Urol.*, 1953, 25: 103.

The author cites 4 case histories to illustrate the following complications which may occur after treatment of advanced renal tuberculosis with streptomycin and para-aminosalicylic acid: (1) dilatation of the upper renal tract associated with reflux up the ureter, (2) further contracture of the bladder, (3) stricture formation of the tuberculous ureter.

These changes resemble closely those found occurring naturally in advanced renal tuberculosis with the passage of time, but with treatment there is a considerable increase in the rate of the development, probably produced by the very efficiency of streptomycin and para-aminosalicylic acid in their destruction of the tubercle bacilli and the consequent liberation of toxin with inflammatory reaction leading to fibrosis.

The author feels that, as things are, it is probably wise not to use streptomycin and para-aminosalicylic acid at all in advanced cases of renal tuberculosis.

ROBERT O. BEADLES, M.D.

Partial Nephrectomy in the Treatment of Renal Tuberculosis (La néphrectomie partielle dans le traitement de la tuberculose rénale). S. PETKOVIĆ. *Helvet. chir. acta*, 1953, 20: 107.

Seven partial nephrectomies performed at the Urologic Clinic of the Faculty of Medicine at Belgrade, Serbia, are reported. All these patients were males, from 20 to 36 years of age. In 6 cases the condition was unilateral; in the seventh case, in addition to the cavity in the lower pole of the right kidney—which was resected—there were two cavities in the left kidney, one in the upper and the other in the lower pole. This patient received streptomycin and para-amino-salicylic acid for 2 months prior to operation. The resection wound healed well, despite stenoses at the two ends of the ureter; however, the urine remained positive for Koch's bacillus. In this material there were no instances of unilateral (residual) kidney.

Excluded from the operation were those patients who were extremely young or extremely old, those instances in which the alterations of the vesicopyeloureteral system were thought to be too severe, diffuse conditions, and those which did not exhibit improvement under antibiotic treatment. Patients with conditions that gave prospect of complete cure under medical management were not operated upon. For such patients a month's treatment was considered adequate.

The technique of resection was the usual one for this procedure, and the author emphasizes the avoidance of unnecessarily depriving any of the renal tissues of their blood supply. No arteries were ligated at the hilus. Resection of the upper pole of the kidney was done in 4 instances, and of the lower pole in 3 instances. During the resection of the cavity of the upper pole in 1 case, a larger cavity, farther down, which had not been demonstrated was opened with soiling of the operative field. Extension of the resection (mediorenal resection) was necessary. In this case, upon urographic examination under pressure a small fistula opened and has since drained intermittently. The remaining 6 patients recovered without complications and there were no deaths. In one other instance the urine has remained positive for tubercle bacilli; this patient was in poor general condition, with severe strictures of the urinary tract, and partial resection was decided upon with a great deal of reserve.

In a study of the literature, the author finds that in the last series of 98 partial nephrectomies, including 7 personal cases and excluding cases of unilateral kidney, there has not been a single death.

JOHN W. BRENNAN, M.D.

Partial Nephrectomy in Renal Tuberculosis. EINAR LJUNGGREN and OLA OBRANT. *Acta chir. scand.*, 1953, 105: 319.

The authors state that partial nephrectomy in renal tuberculosis can be carried out successfully now that chemotherapy can be employed. They advocate a sanatorium regime for at least 6 months including chemotherapy with para-aminosalicylic acid and streptomycin. Intravenous therapy is employed to localize the tuberculous lesion exactly within the kidney. The lesion must be limited, it must be situated in one of the renal poles, and the ureter and kidney pelvis must be involved only

slightly, if at all. Renal arteriography may be advantageous in order to ascertain the topography of the renal artery.

Authors employ clamping of the renal pedicle as little as possible. The vessels running to the pole of the kidney in question are divided, the pole is decapsulated, the involved part of the kidney is resected, and the bisected calyx is sutured carefully. The divided vessels are ligated. Finally, the extra kidney capsule is folded in to cover the incised surface. Sutures are so placed as to include only the capsule and a minimal amount of renal parenchyma.

Partial nephrectomy has been performed on 15 patients. The tuberculous process showed a tendency toward healing (in the resected tissues). In the first 10 patients, 8 or more months after operation, animal inoculation with the urine was negative. In 2 cases, secondary nephrectomy was performed, in one because of a urinary fistula, and in the other because the urine still was positive for tuberculosis. DAVID ROSENBLOOM, M.D.

Kidney Homotransplantation. W. J. DEMPSTER. *Brit. J. Surg.*, 1953, 40: 447.

The author, in an extensive investigative project concerning kidney homotransplantation, presents an analysis of the behavior of 85 homotransplanted kidneys. He gives reasons for rejecting the theory of local tissue immunity (Loeb). Evidence is presented which suggests that such kidneys are rejected by means of an actively acquired immunity in the host. The plasma-cell infiltration which accompanies the disintegration of these kidneys is shown to be renal in origin; no local cell infiltration occurs between the host and the homotransplant. The part played by infection and the plasma cell infiltration is discussed. The cause of arrest of function is concluded to be vascular spasm. The host-homotransplant relationship is stressed; the host reacts against the kidney and the latter against the host.

JOSEPH E. MAURER, M.D.

Some Observations upon Absorption after Ureterosigmoidostomy. C. D. CREEVY. *J. Urol.*, Balt., 1953, 70: 196.

Widespread interest in the absorption of electrolytes from the colon following ureterosigmoidostomy is a relatively recent development. Jewett, in 1940, suggested that the absorption of urinary chlorides might produce acidosis which could be corrected by a low salt diet and alkalis. Ferris and Odel, in 1950, proved that the condition could also be relieved by means of unilateral nephrostomy or by continuous irrigation of the rectum with tap water. Further importance of the renal factor was demonstrated by Lapides. His experiments showed that hyperchloremic acidosis developed with prolonged urinary dripping into the colon of patients with gross impairment of renal function. In the presence of normal kidneys this did not occur.

Four factors are thought to influence the severity of absorption: the surface area of the colon exposed to the urine, the time of exposure (frequency of evacuation), the segment of the colon with which the urine comes in contact, and the functional capacity of the kidney.

The last factor seems to be the most important. It is believed that tubular damage sufficient to impair the excretion of chlorides may result from pyelonephritis too mild to produce recognizable pyelographic deformity. In a study of a group of ureterosigmoidostomices, correlating renal damage with hyperchloremia and acidosis, 44 per cent of 41 patients with normal urea readings had hyperchloremia, 22 per cent with acidosis and 2.4 per cent with symptoms. Of 40 patients with more definite kidney damage, indicated by elevated urea, 75 per cent had hyperchloremia, 70 per cent had acidosis and 22 per cent had symptoms. Studies based on the urographic evaluation of kidney function gave similar results.

The author presents clinical experiments and data on 6 patients in the evaluation of all factors. Since the kidneys commonly suffer from dilatation and infection after ureterosigmoidostomy, one of the solutions to the problem of hyperchloremic acidosis appears to be the protection of the renal organs from these complications. The most promising method seems to involve making a terminal colostomy above the anastomosis. Evaluation of this will require much experience. ALLAN K. SWERSIE, M.D.

BLADDER, URETHRA, AND PENIS

Histological Studies on the Local Action of Roentgen Therapy in a Case of Vesical Tumor (Controllo istologico sull'azione della plesio-roentgenterapia in un caso di tumore vesicale). G. PICCOLO and G. LONGO. *Arch. ita.. urol.*, 1953, 26: 91.

The authors report the detailed histological changes which result after roentgen therapy for tumor of the bladder. The patient received two treatments of 2,000 roentgens each, filtered through 0.10 of copper at a distance of 7.5 cm. at 60 kv. The patient died of myocarditis and pulmonary edema 19 days after cessation of therapy, and at autopsy careful histological studies of the irradiated bladder were carried out.

The authors conclude that this dosage of radiation may be quite effective in the treatment of bladder tumors. They feel, however, that this treatment should be limited to the type of tumor which does not extend much beyond the submucosa and that the effective maximum range of therapy is a depth of 1 cm. in the bladder wall. The inflammatory reaction found was only of a moderate degree and resulted in minimal symptoms which were easily overcome. GEORGE L. NARDI, M.D.

Reconstruction of the Perineal Urethra with a Free Full-Thickness Skin Graft from the Prepuce. DAVID PRESMAN and DUANE L. GREENFIELD. *J. Urol.*, Balt., 1953, 69: 677.

A negro, 50 years of age, presented himself to the authors for treatment because of a long-standing

urethral stricture complicated by a chronically indurated periurethral phlegmon and watering-pot perineum. Perineal urethrotomy had been performed many times during the past 25 years. Urinary control was good, but all of the urine was passed through the multiple perineal sinuses. None passed through the penile urethra. Treatment consisted of the administration of antibiotics and hot compresses, followed by suprapubic cystostomy. After several months much of the infection and induration in the perineum had subsided, so operation was undertaken.

Operation consisted of the usual excision of all the infected perineal tissue, the fistulous tracts being excised down to the perineal urethra. The latter was found to consist of a nonpatent cord of dense scar tissue about 1½ inches in length. This was excised, which left a urethral defect. A No. 20 F. straight catheter was then passed through the penile urethra across the defect and through the proximal urethra into the bladder. An ordinary circumcision was then performed and a cuff of prepuce about ¾ inch in width and 2 inches in length was removed from the penis. This was wrapped lengthwise around the exposed portion of the catheter in the perineum, with the skin surface facing inward toward the catheter. The redundant portion of the graft was trimmed off and the graft was sutured together lengthwise with interrupted sutures of No. 0000 chromic catgut. Each end of the graft was then sutured to the adjacent ends of the normal urethra with a similar type of catgut. Two small Penrose drains were inserted in the perineum and the skin was closed with fine silk.

The results were good. The urethral catheter was removed after 2 weeks. Four weeks later, a No. 20 F. sound passed easily. The suprapubic wound was allowed to close and the patient voided normally. The authors are of the opinion that the successful result in this case warrants further trial of this procedure to establish its true value.

JOHN L. EMMETT, M.D.

Utilization of the Scrotum in the Reconstruction of the Penis. BUFORD S. CHAPPELL. *J. Urol.*, Balt., 1953, 69: 703.

Reconstruction of the penis utilizing Frumkin's method (1944) of raising a tube of skin on the abdomen into which a cartilage is transplanted is not feasible in some cases because of the extensive growth of body hair in some individuals. To obviate this difficulty, the author advocates use of the scrotum. All of the scrotum which can be spared is picked up in front of the testes and outlined by two parallel incisions which begin on either side of the base of the penis. The width of this piece of scrotum should be sufficient to enclose a piece of cartilage 8 to 10 cm. in length and as thick as can be removed from the costal margin. The proximal end of the cartilage is made wedge-shaped to be pushed about 2 cm. into an incision made in the stump of the penis, from which the skin has already been separated by pulling the scrotal flap to one side. The distal end of the flap is left attached to the scrotum for 2 weeks to insure viability of the graft. It is then detached by a semicircular incision which leaves a scar that simulates the appearance of a corona and glans. (Illustrations of the technique accompany the original article.)

The author reported 1 case in which the patient had had partial amputation of the penis for carcinoma. Stricture of the terminal urethra had necessitated a permanent perineal urethrostomy. Because of excessive sexual urge and resulting psychoneurosis, the author agreed to try to reconstruct a penis by means of Frumkin's technique. After operation, the cartilage sloughed and had to be replaced 6 months later. The final result was fairly satisfactory however, as the patient stated that he was able to have reasonably satisfactory intercourse and complained only of moderate premature ejaculation.

JOHN L. EMMETT, M.D.

GENITAL ORGANS

What Makes the Prostate Grow? WILLIAM WALLACE SCOTT. *Tr. West. Sect. Am. Urol. Ass.*, 1953, 19: 13.

Normally placental male mammals are born with prostate glands. During the last trimester, and for a short time after birth, distinct histological changes can be observed which include squamous metaplasia and focal hyperplasia of fully differentiated epithelium. It has been suggested that these changes are due to the action of gonadal hormones derived either from the mother or from the fetal gonads under the stimulus of maternal gonadotrophic hormones. Shortly after birth, retrogressive changes occur, and it is not until the testes begin to elaborate their hormones that we again note changes in the size, histology, and function of the prostate gland. Few changes are noticed during the next 50 years unless disease or infection takes place. Thereafter, nodular hyperplasia develops in most glands and carcinoma in many. With the evidence at hand, the best working hypothesis is that both benign hyperplasia and cancer of the prostate result from a disturbance of the ratio and quantity of androgens and estrogens in older men.

The effect of castration results in profound atrophy of the prostate which includes both the fibromuscular and the epithelial elements with almost complete abolition of the prostatic secretion. When the testes have been removed it is difficult to determine exactly what has been eliminated from the body. It is known that crystalline androgens and estrogens have been extracted from testicular tissue. This does not necessarily mean that both are made in the testes nor in the form in which they were isolated. There are numerous theories as to which particular testicular cells are responsible for the formation of androgens and estrogens. It is generally thought that the interstitial cells of Leydig form the androgenic material, and with evidence derived from work on a dog it is tempting to assign estrogen production to the Sertoli cells and to further

postulate that, with age, estrogen production exceeds androgen production.

Unfortunately, the evidence is not conclusive and the nature of the internal secretion of the testes remains in doubt, and until such time as the question is clarified it is inaccurate to assign the effects of castration to only androgen withdrawal as is commonly done.

The pharmacological action of androgens and estrogens depends on a multiplicity of conditions which include the size of the dose administered, whether it is administered singly or in combination, or whether it is given to an intact animal or castrated one; also, the condition of the liver and the organism as a whole, and the state of nutrition. The effects must be described in terms of whether there is an effect on size, or function, and of which histological elements are affected, whether fibromuscular or epithelial. When androgen is administered to the castrated rat it causes uniform development of all true prostatic tissue, and when given to the dog it causes prostatic secretion.

On the other hand, great confusion arises as to the effect of estrogens on prostatic growth, and much of this revolves around the size of the dose given and the particular portion of the prostate gland to which reference is made. The author was unable to counteract prostatic weight gain in castrated rats maintained on constant doses of testosterone propionate with large, small, or moderate doses of either estradiol or stilbestrol. Much more work is necessary.

Both androgens and estrogens have been extracted from the adrenal gland, presumably from the cortex. Reasons for believing that the normal adrenal cortex makes androgen and estrogen stem in part from observations on patients with either masculinizing or feminizing tumors; yet this is an abnormal situation and one in which there is distinct cellular alteration. This whole subject remains unsettled and it has recently been stated that adrenocortical androgens are not likely to have an important role in man, since a compensatory increase in androgen secretion by the adrenal cortex, if it does occur, is not of sufficient magnitude to prevent the development of deficiency symptoms following castration of the human male. For years it has been known that the pituitary exerts a regulatory effect on the testes and on the prostate. It was considered that stimulation of the prostate by the pituitary was entirely dependent upon the intact testes; for example, a pituitary principle known as the interstitial cell-stimulating hormone stimulates the interstitial cells to produce androgen, which in turn stimulates prostatic growth. It has recently been found that prolactin is another prostate-stimulating hormone elaborated by the pituitary and in rats has been found concentrated in the prostate, not the testis. Of added interest is the observation that estrogens inhibit either the release of prolactin from the pituitary or its action after release. The liver normally inactivates estrogens; however, in the animal under conditions of experimental cirrhosis the liver fails to inactivate estrogen implants in the spleen. However, even with severe liver damage androgens were inactivated, so it seems that under severe stress the liver is a physiological filter for testosterone propionate and probably for other androgens, but not for estrogens. A hint that this may hold for man is suggested by the observations in World War II that male prisoners, when starved, developed gynecomastia. The possibility of creating an adrenal shunt in an effort to cause the liver to inactivate adrenal androgens for the treatment of advanced prostatic cancer is now being investigated.

Knowledge gained in the laboratory has helped in the treatment of disseminated prostatic cancer. The profound beneficial effects of castration and/or estrogen therapy were largely worked out as a result of study of hormonal action in the fistulized dog. Again on the basis of animal studies, bilateral adrenalectomy has been used in the treatment of the patient who has relapsed after castration. Recently, hypophysectomy was followed by profound atrophy of a prostatic cancer. ROBERT O. BEADLES, M.D.

The Adiuretin Test; a Rapid Renal Function Test in Hypertrophy of the Prostate (Der Adiuretintest als Nierenschnellfunktionspruefung bei der Prostatahypertrophie). H. DETTMAR and W. BRENNER. *Zschr. Urol.*, 1953, 46: 221.

Kidney function should be investigated routinely before any prostatic surgery is performed. The Volhard specific gravity test has the disadvantage that during the thirst period ascending infection may occur and lead to pyelonephritis. Furthermore, the Volhard test requires a long time, and the thirst period is distressing to the patient.

The authors devised a modification of the Volhard test by injecting tonephin (vasopressin) intravenously after the ingestion of 1,500 c.c. of tea. The injection of the posterior pituitary hormone changes the polyuric phase of the test into an oliguric phase with simultaneous rise of urine concentration and specific gravity.

The following technique is applied: after the patient has ingested 1,500 c.c. of tea, a catheter is inserted, the excreted urine is collected at 5 minute intervals, and the amount and specific gravity of each 5 minute portion is determined separately. After the diuresis has reached its climax, 0.3 unit of tonephin is given intravenously, and the collection of urine is continued at 5 minute intervals. The oliguric phase, after the injection of tonephin, lasts for about 30 minutes; then the diuresis rises again, and the specific gravity drops.

The amount of urine excreted within 5 minutes during the oliguric phase is only 2 to 3 c.c. This volume is so small that the specific gravity cannot be taken directly with the gravimeter. Therefore, the urine is diluted with water to a volume of 7 c.c., and the specific gravity is computed after a formula given in the article.

With this method, the entire dilution and concentration test can be performed in about 30 minutes and the disagreeable and potentially dangerous thirst period is avoided. WERNER M. SOLMITZ, M.D.

Clinical and Histologic Considerations with Reference to the Subject of Carcinosarcoma of the Prostate (Rilievi clinici e istologici sul carcinosarcoma della prostata). LUCIANO DELZOTTO and SERGIO GODENA. *Urologia*, Treviso, 1953, 20: 44.

The 62 year old patient had been suffering for some months with acute urinary retention, diurnal and nocturnal pollakiuria, burning sensations in the bladder, difficulty in starting urination, and turbidity of the urine. On admittance, the prostate was found to be enlarged to the size of an orange; it was particularly enlarged on the right side, of woody consistency, nodular, and irregularly shaped. The preoperative diagnosis was carcinoma of the prostate. Estrogens were given, and a bilateral subcapsular orchectomy was done. After a month a perineal prostatectomy was performed.

The histologic findings appeared to confirm the preoperative diagnosis of adenofibromatosis with initial superficial carcinomatous metaplasia; however, in some areas there was revealed epithelial papillary hyperplasia with the characteristics of an early malignancy. The pegs of epithelial hyperplasia had invaded the underlying connective tissues; the cells were of various sizes, with hyperchromic and irregularly rounded nuclei, at times exhibiting atypical mitoses. At times there were noted elements with one or more nuclei.

Later, boring pains developed in the perineal and sacral regions. Roentgenograms demonstrated bone metastases in the fourth lumbar vertebra, and roentgen therapy was instituted. The pains, however, continued in the perineal region and a firm, elastic tumefaction appeared in this region, accompanied by fever, edema, and a mild reddening of the skin.

A generous biopsy specimen from this swelling led to surprising histologic findings. In the various sections examined were revealed the presence of extensive areas of amorphous necrosis in which appeared vague indications of cartilaginous tissue. In the peripheral zones, still discretely stainable, there was visible a fasciculated structure, the principal components of which were ovoid or spindle-shaped cells of irregular sizes. The nuclei were hyperchromic with occasional atypical mitoses. Here again were voluminous elements with numerous nuclei stacked in the center of the cell. There was some calcareous precipitation. The recurrent tumor proved to be a fibrochondrosarcoma.

The patient's condition continued to worsen; dyspnea, dysphagia, and perineal pains became ever more severe; fever appeared, and the patient died approximately 1 year from the time of the first examination. Autopsy disclosed widely disseminated pulmonary metastases which exhibited an even more extensive cartilaginous component, but otherwise were of a sarcomatous character.

This neoplasm is considered by the author to be a true carcinosarcoma; the two elements, carcinomatous and sarcomatous, were intermingled, but with the islands of carcinomatous cells sharply delimited from the surrounding sarcomatous tissue. The association of the two elements rules out the presence of a tumor duplicitas, in which the contiguity may be close; however, there is no actual interpenetration, although both tumors must arise from separate points of the same organ. The absence of diffuse interpenetration pretty well rules out the possibility of the presence of a pseudocarcinosarcoma, or the implantation of a sarcomatous metastasis in a carcinomatous neoplasm, or the reverse. Other types of two, or more, tissue tumors need hardly be considered here.

There remains, nevertheless, the task of properly placing this tumor into the classification of carcinosarcomas in general. In the matter of histogenesis, the author distinguishes 4 varieties of carcinosarcoma of the prostate: (1) mutational carcinosarcoma, or that tumor resulting from the transformation of the stroma of a carcinoma into sarcomatous tissue; (2) the carcinosarcoma of composition, in which there is a simultaneous proliferation in the neoplastic sense of connective tissue and epithelial cellular elements of the same organ, with the development of a neoplasm composed of two blastomatous tissues; (c) the carcinosarcoma of combination, or the development of different types of cells, but all arising from a common germ of mixed type; and (d) the carcinosarcoma of collision, which group is thought to correspond to the author's tumor, and to result from the encounter of two tumors developing independently at two different points (close together) in the same organ, and subsequently undergoing a process of interpenetration.

This tumor is the sixth of its kind to be reported in the medical literature of the world, at least insofar as the author is able to learn from a study of the literature available to him.

JOHN W. BRENNAN, M.D.

The Response of Prostatic Carcinoma to Estrogen Treatment. J. D. FERGUSSON and L. M. FRANKS. *Brit. J. Surg.*, 1953, 40: 422.

The authors have investigated the changes that occur in prostatic carcinoma after prolonged treatment with estrogens and conclude that clinical regression is associated with histological evidence of cell destruction in the prostate. Usually the tumor cells, but not the normal tissue, eventually become insensitive to the hormone, and even in cases showing a marked histological response to estrogen there are always surviving tumor cells.

It appears that estrogen sensitivity is independent of the degree of differentiation or anaplasia, and thus grading is of little value for the prognosis. The presence of metastases when the patient is first seen tends to reduce the survival period, and a breast response to estrogens is often associated with a good clinical response. JOSEPH E. MAURER, M.D.

Developments in Surgery of the Prostate Gland (Wandlungen in der Prostatachirurgie). G. BIEDERMANN. *Zschr. Urol.*, 1953, 46: 232.

The author, of the Surgical Department of the University of Innsbruck, Austria, reports on a series of 40 suprapubic prostatectomies and 12 resections by electrocoagulation, performed in autonomic ganglion bloc by methonium salts (hexamethonium bromide). The blocking of the autonomous ganglia lowers the systolic blood pressure to 55 to 65 mm. Hg, and causes a relative anemia in the field if the pelvic region is kept in elevated position during and after the intervention.

The author stresses the great advantage of this method; it enables the surgeon to operate more rapidly and obviates the ligating of bleeders; the severed blood vessels bleed hardly at all, and postoperative hemorrhage need not be feared if the blood pressure is kept low for 6 to 8 hours after the operation.

After extirpation of the prostate the incision in the bladder wall is closed by purse-string suture; the wound lips are inverted so that no suture lies within the bladder cavity. As scarcely any surgical hemostasis is necessary, the entire operation can be performed within 15 minutes.

At the conclusion of the operation the systolic blood pressure should be 70 to 80 mm., and should reach normal values only after 6 to 8 hours. During this time the elevation of the pelvic region should be maintained. To prevent hypoxemia, oxygen is given continuously until normal blood pressure is restored.

The results were excellent. There were no deaths, no postoperative hemorrhage, and the wounds healed faster than after operations without autonomous blocking. The author adds a postscript stating that after completion of the article another 95 patients were operated on by this method without a single fatality.

The second part of the article is a report of the results of studies concerning the metabolism, the renal function, and the electrocardiogram during the lowering of the blood pressure under methonium salts. No hyperglycemia was observed, the nonprotein nitrogen was unchanged, the uric acid was slightly elevated, and the electrocardiogram did not differ from that usually observed during anesthesia.

WERNER M. SOLMITZ, M.D.

Considerations with Reference to the Transvesical Prostatectomy of Harris-Hryntschak (Considerazioni sulla prostatectomia transvescicale secondo Harris-Hryntschak). MICHELANGELO SORRENTINO. *Urologia*, Treviso, 1953, 20: 23.

The effects of prostatectomy on 508 patients are here reported. Eight of these patients were under 50 years of age, 75 were from 51 to 60 years, 271 were 61 to 70, 137 were 71 to 80, and 11 were over 80 years of age. In the first group of 8 cases there were no deaths; in the group of 75, 4 (5.3%) died; in the group of 271, 12 (4.4%) died; in the group of 173 patients, 4 (2.9%) died; in the last group of 11 patients (over 80 years of age) 1 died (9.0%). This gave a mortality of 4.2 per cent for the entire 508 patients. Here, however, it should be noted that 1 of these patients died of cardiac infarct, 1 died of allergic shock (probably as a result of a blood transfusion), and 1 died of cachexia (probably as a result of gastric metastases).

Among these prostatectomies there was not a single instance of severe hemorrhage. In those cases in which there was moderate bleeding, the occurrence could be ascribed to the fact that the sutures in the bladder neck were not well placed, or that the urethra had not been tightly closed. These early accidents could, in turn, be ascribed to the fact that the men on the author's service were not as yet sufficiently adept in the use of the technique. All these bleedings, however, simply continued to the point where the internal pressure in the prostatic bed equaled that of the blood pressure in the afferent bleeders. Small transfusions always provided the hemostatic and replacement effects necessary to correct the condition. On the other hand, careful preparation of the prostatic bed before completing the suture in these operations provides the most favorable condition for rapid healing; the catheter was usually removed after the fifth to the eighth day, although, on occasion, it was retained until the fifteenth day; after removal of the catheter the patient always urinated well. In this last connection, however, it might be well to remark that the catheter was always bulky (22 to 23 Charrière); in more recent times it has been composed of vinil, which has a more roomy lumen and is less inclined to collapse under the stress of strong suction forces. However, the healing of the operative wound is better than with the other three methods of operation (Millin, Hay, Fabre), after which the technique of Hryntschak is patterned. The operation is not more traumatizing than these other 3 methods; in fact, the only operation for prostatic adenoma which is less likely to affect the chances of recovery of the already severely damaged patient (obesity, cardiopathy) is the perineal operation; however, the perineal prostatectomy induces an operative insult to the region of the pelvis which is physiologically the most important, and does not offer as satisfactory an approach to pathologic conditions of the urinary bladder, such as stones and diverticula.

The author concludes that although all these operations may have their special indications, the operation of Hryntschak deserves a position of preference among the various techniques of prostatectomy. Of course, this operative technique cannot be used to the exclusion of all others, since—as we have already indicated—the perineal approach and even the classical operation of Freyer still have their indications; however, the Hryntschak technique is always to be preferred to the Millin, and especially is it to be preferred to the two techniques of Hey and Fabre, which most closely resemble it.

JOHN W. BRENNAN, M.D.

MISCELLANEOUS

The Subject of Allergy in the Practice of Urology (Die Allergie in der Urologie). H. HEUSSER. *Helvet. chir. acta*, 1953, 20: 128.

Having been assigned the task of evaluation of the status of allergy in the practice of urology for the Urologic Society of Switzerland, the author reviews the pertinent literature (mostly American) relating to cases in which urologic symptoms such as hematuria, colicky attacks, urinary retention, nocturia, dysuria, and stranguria were relieved by antiallergic measures. Finally he cites a few recent observations of his own: (1) a patient with bleeding from the urethra and coincidental hemicrania; (2) a young woman with cystalgia occurring invariably on Tuesdays; (3) a middle-aged man with chronic eczema who was sensitive to formalin and who exhibited frequent attacks of colic of the ureter without local findings; and (4) a 50 year old woman with hematuria lasting for months, who was fearful of the presence of hypernephroma although her examination was always absolutely negative. These cases are not yet ready for reporting.

On the whole it is believed that there is sufficient evidence to conclude that the urogenital tract does act as an effectuating organ for allergic reactions and as an organ of resorption for allergens. This evidence is neither so plentiful nor so convincing as in the case of the organs of respiration and of alimentation; however, it can in no wise be considered as negative. The allergens may arrive in the urogenital system by two principal routes: by excretion through the kidney, and retrogradely by introduction (formalin) on urologic instruments.

Of course, allergy may not represent the entire picture; it may act as a trigger for subthreshold neurosympathetic dyscrasias, the urologic manifestation representing merely an effector end-organ of the generalized disturbance. In these instances—and the author cites some from the literature—the patient may not respond to antiallergic measures, but may respond to preparations (atropin or pilocarpin) aimed at the sympathetic nervous system.

In any event, allergy should be looked for in the urologic patient, just as in the gastrointestinal and respiratory sufferers. For the urologist, however, all modalities for urologic diagnosis should be exhausted before turning the patient over to the allergist. For the urologist, the maxim also holds that allergy should be considered early, but should seldom be diagnosed. JOHN W. BRENNAN, M.D.

Postoperative Osteitis Pubis (Uber die postoperative Osteitis pubis). O. FROEHLICH and L. FARKAS. *Zschr. Urol.*, 1953, 46: 145.

Osteitis pubis has been observed, though rarely, with other than exclusively urologic conditions, such as herniorrhaphy, war injury, symphyseotomy during childbirth, cervicopexy, or metastatically from pharyngo-otitis or pyelonephritis. An extensive review of the literature is presented by the authors. Forty-one published cases are mentioned. The condition is characterized by a localized, nonpurulent, necrotizing inflammation of the bone originating at the symphysis and extending to the pubic, and even to the ischial, bones. Only rarely does the entire pelvis become involved. Pain appears in from 3 to 16 weeks postoperatively and is caused chiefly by contraction of the involved muscle groups, which may extend from the rectus abdominis and pyramidal muscles to the adductors and hamstrings. The pain may radiate towards the testicle and Scarpa's triangle, and may lead in some instances to involvement of the muscles of the pelvic floor, to bladder cramps, and rectal tenesmus.

On examination, swelling and tenderness of the symphysis is observed. In rare cases, probing of a sinus will disclose rough bone; there is hyperesthesia in the skin distribution of the obturator nerve; the temperature is subfebrile, and in rare cases there is bacteriemia or pyemia; the gait resembles that of a person on skis. Roentgenologic changes are seen approximately 6 weeks after the clinical onset. Irregular contour of the pubic bones, periosteal thickening, a moth-eaten appearance with decalcification of the bone are seen and, by reabsorption of the cartilage, symphyseolysis may be simulated. The period of destruction may last from 2 to 8 months and the period of restitution may last up to 2 years. Osteosclerosis or narrowed and ankylosed symphysis may result. In the differential diagnosis, osteomyelitis, and tuberculous, luetic, and metastatic bone lesions should be considered.

Three theories as to the etiology are offered: (1) infectious, (2) traumatic, and (3) mixed. The pros and cons of these theories are discussed at length, and it is concluded that the cause is not necessarily the same in all cases. Three types of therapy are mentioned: (1) antibiotics, (the most effective of these is streptomycin), estrogen treatment, vitamin B in high doses, ACTH, novocain injection of the obturator nerve; (2) local compresses, moist or dry heat, but by far the best is deep x-ray therapy occasionally combined with diathermy; (3) surgery consisting of curettage, removal of the sequestrum (rare), or resection of bone (not recommended by the authors).

Preventative measures consist of keeping the urinary infection at a minimum, operating cautiously without undue traumatization to the rectus muscles, the puboprostatic ligaments and the periosteum, and prolonged drainage of the space of Retzius.

The prognosis is good; very few fatalities are mentioned in the literature. Among 232 prostatectomies and 207 open bladder procedures, 3 instances of osteitis pubis were seen following a Freyer prostatectomy.

Case 1. A 68 year old patient with a suprapubic sinus (8 weeks after prostatectomy) underwent curettage of a fistula from which urine infected with E. coli and B. proteus had been drained previously. The sinus tract closed after this intervention. In

the fourth postoperative week, anesthesia, pain, and spasm in the thighs developed, followed by edema of the lower extremities without signs of thrombosis. The symphysis pubis and Scarpa's triangle were swollen and tender. X-ray examination in the sixth week disclosed pathologic changes with periosteal thickening, contoural irregularities, and decalcification. In the ninth postoperative week the condition improved.

Case 2. A 65 year old patient underwent a suprapubic prostatectomy and partial resection of the bladder for a papilloma. A suprapubic fistula was present for 9 months and necrotic fascia and ligatures were expelled. Urinary infection with E. coli and B. proteus was present. Pain, swelling, tenderness, muscular spasms, and tenesmus of the rectum and bladder appeared in the third postoperative week and lasted for 4 weeks. X-ray examination disclosed a moth-eaten appearance of the pubic and ischial bones. After 12 weeks the patient was able to walk with the aid of a cane. Six months after operation he was discharged with a de Pezzer catheter, which fell out while he was at home. The suprapubic sinus was then curetted and closed spontaneously, but a new sinus developed over the right gluteal fold and drained urine. Fifteen months later this sinus and the underlying rough bone were curetted, and penicillin in high doses was administered. Eventually, 22 months after operation, the patient was free from complaints.

Case 3. A 39 year old patient whose suprapubic sinus closed 3 weeks postoperatively, continued to have cystitic complaints and the urine was infected with E. coli. One and one-half years postoperatively this patient developed a mild osteitis pubis, which was confirmed by clinical and x-ray examination. X-ray therapy—1,200 roentgens—hot baths, and high doses of penicillin cured his condition.

The authors are inclined to accept a combination of trauma with infection as the cause of osteitis, which they believe should be considered as a mild form of osteomyelitis with but feebly virulent microorganisms. The swelling of both lower extremities in Case 1 is explained on grounds of venous stasis owing to edema in Scarpa's triangle. Case 3 is considered noteworthy with a long period of incubation (1½ years), and the mildness of the course in this case is thought to be characteristic of a long incubation period. ERNEST BORS, M.D.

Erythroplasia of Queyrat. JAMES W. MERRICKS and THOMAS L. C. COTTRELL. *J. Urol.*, Balt., 1953, 69: 807.

It is important to recognize the condition known as erythroplasia of Queyrat in order to institute adequate therapy promptly. It is a precancerous penile lesion characterized by an irregular but sharply demarcated, round or oval, red, grossly lobulated, flattened yet slightly raised appearance with a smooth velvety sensation, shiny appearance, and a somewhat more firm consistency than the surrounding normal skin.

The etiology of the lesion is unknown, although irritation, trauma (with or without scar formation), and inflammation have been suggested as possible predisposing factors. The disease occurs more often in the male than in the female, in a ratio of 2 to 1, and in the second half of life. The lesion has little relation to the presence or absence of the prepuce.

This lesion is usually present on the dorsal aspect of the glans penis or along the labia minora or interlabial furrow, or on the labia majora. It gradually progresses and, histologically, is found to be dyskeratotic with rete peg hypertrophy, or of the hyperplastic type which reveals a strong acanthotic reaction with elongated interpapillary buds having minor ramifying qualities. It requires adequate and prompt therapy. If the lesion is considered benign, conservative local therapy with neoarsphenamine or borax solution irrigations, protective dressings, bland ointments, and a mechanical tube preventing local irritation is used. However, electrocoagulation, carbon dioxide freezing, and local excision have met with variable degrees of success. If the lesion is considered precancerous or malignant more radical surgical intervention is required with partial amputation of the penile shaft 2 cm. proximal to the lesion edge followed by careful postoperative examinations. In advanced cases a radical penile lymph node dissection is required. PETER L. SCARDINO, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Biophysical and Physiological Investigations on Cartilage and Other Mesenchymal Tissues. VI. Characteristics of Human Nuclei Pulposi During Aging. CARL HIRSCH, STEN PAULSON, BENGT SYLVÉN, and OLLE SNELLMAN. *Acta orthop. scand.*, 1953, 22: 175.

Previous electron microscopic, diffusion, and fractionation studies indicate that the healthy intervertebral nucleus pulposus in young subjects represents a three-dimensional lattice gel, in which cell bodies and intercellular material can be distinguished. The latter contains a dense collagen-reticulin feltwork embedded in a matrix or "ground substance," which holds large amounts of chondroitin sulfate, water, and salts. Electron microscopic and fractionation data further suggest a very close relationship between the collagen and polysaccharide moieties.

A total number of 65 lumbar and lower thoracic discs were collected from 10 autopsy cases of various ages, from birth until 73 years of age. Data on the gross anatomy and microscopy of the nucleus pulposus were registered, together with wet and dry weight determinations and the sulfur values. The ratio between sulfur and collagen contents decreases with age. The amount of collagen material per unit of tissue volume increases, while the absolute amount of polysaccharide largely remains on a stationary level or undergoes a slight decrease with high age. A comparison between sulfate and dry weight values in the thoracic and lumbar region indicates that the typical "degenerative" changes appear at an earlier age, preferably in the lower lumbar segments. The amount of collagen increases, while the ratio between the amounts of polysaccharide and collagen per unit of tissue volume has decreased during the process of aging.

The authors suggest that a detailed analysis of mass relations and quantitative ratios of various tissue constituents may guide future classification of those disorders. C. FRED GOERINGER, M.D.

Studies on Structural Changes in the Lumbar Annulus Fibrosus. CARL HIRSCH and FRITZ SCHAJOWICZ. *Acta orthop. scand.*, 1953, 22: 184.

This paper covers the results of a macroanatomical, histological, and electron-microscopical investigation of the annulus fibrosus of the lumbar intervertebral discs.

The lumbar spines from 105 fresh autopsy cases of different ages have been examined roentgenologically. All the intervertebral discs have been cut through horizontally and examined macroscopically. In 65 cases, all 5 lumbar discs have been systematically studied histologically.

The annulus fibrosus or, better, lamellosus, since it consists of a lamellar system, or fibrocartilage, was already found distinctly developed in a 7-months-old fetus (25 cm.) and was clearly distinguishable from the nucleus pulposus. The ventral ligament is denser and has thicker fibers than the posterior ligament. Toward the sides the annulus shows approximately the same structure as it does ventrally. The annulus in the adult is entirely lacking in blood vessels. No cases were found in which any nerve fibers were detected in the annulus.

The most common changes observable in the annulus are concentric cracks or cavities. They frequently occur as early as the fifteenth year and increase with advancing age, both in extension and in frequency. Their occurrence may possibly be due to disturbances of the polysaccharides in the intercellular substance of the annulus fibrosus. These radiating ruptures in the annulus are met most frequently in the posterior part of the lower lumbar discs. If the rupture is complete and extends out towards the long ligament, there grows out from the latter a highly vascular connective tissue into the nonvascular annulus. If the rupture is small and not very extensive, a healing process—an overbridging of the annulus lesion—may set in. A fibrous scar is formed in the annulus. If, however, the rupture is more or less extensive and the disc still retains its elasticity, the ingrowth of connective tissue does not involve the formation of scars in the area in question.

The frequency of radiating ruptures is highest in the two lowest lumbar discs, in which they arise far earlier than in the intervertebral discs situated higher up. The occurrence of these ruptures coincides in time with those periods during which lumbago and sciatica show the highest clinical frequency and before x-ray photographs can throw any light on the condition of the intervertebral disc.

For purposes of discussion, the authors present the idea that the appearance of a highly vascular granulation tissue within the intervertebral disc may constitute a new pathological basis for the presence of low back pain.

In operations for sciatica, Wiberg and Hirsch have been able to demonstrate that certain intervertebral discs are extremely sensitive to blunt pressure. Operations have been performed on patients in whom a local anesthetic has been administered in the lumbar musculature down to the ligamentum flavum. In such cases, before the supplementary anesthetic has been administered the intervertebral disc has been palpated with a metal probe. In a number of cases, even when only moderate pressure has been exerted against the posterior protrusion of the disc, these patients have declared that they felt intense lumbar pains. Many patients suffering from degeneration of a lumbar disc feel extreme tenderness and a marked sensitiveness to mechanical irrita-

tion within the posterior protrusion of an intervertebral disc and here confined to a small area.

It is still not clear whether the annulus is innervated or not. It has been suggested that mechanical disturbances have the effect of abnormal stresses on the long ligament, in which nerve endings have been found. C. FRED GOERINGER, M.D.

Radiographic Considerations of the Medial Paracondylar Femoral Calcification; Pellegrini's Disease (Considerazioni radiologiche sulla calcificazione paracondiloidea mediale; malattia di Pellegrini). SERGIO CHIAPPA. *Ann. ital. chir.*, 1953, 30: 213.

The author presents 35 cases of medial paracondylar femoral calcification (Pellegrini's disease) following trauma. Some of these patients received roentgen therapy at the Instituto de Radiologia e Terapia Fisica Dell' Università di Pavia, in Italy.

After a brief review of the most commonly accepted interpretations of the pathogenesis of the disease, the author illustrates his cases and emphasizes the fact that in 34 of the 35 cases presented, the site of the calcification was the soft tissues surrounding the adductor tubercle of the femur, and the medial collateral ligament was seldom involved. He agrees with Amprini and Cattaneo that the tendons which form the soft tissues of the adductor tubercles have some undifferentiated cells called "vescicolose." He believes that these cells, when traumatized, may be responsible for the calcification found in Pellegrini's disease, and that the process could be explained as due to an abnormal evolution of cells already present in the normal tendons rather than to a true process of metaplasia, as is believed by many authors.

Many of the patients treated with roentgenotherapy were temporarily relieved of subjective symptoms, without any changes in the morphology or evolution of the calcifications.

FELIX STANZIOLA, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Functional Results in Arthroplasty of the Hip Joint (Résultats fonctionels de l'arthroplastie de la hanche). R. MERLE D'AUBIGNE. *Acta orthop. belg.*, 1953, 19: 81.

The results obtained in 536 arthroplasties are reported. In 106 of these the cup method was used; in the remaining 439 operations the method used was that of the acrylic head (Judet prosthesis, or modification). The results are discussed under two headings: immediate results and late results.

The discussion of immediate results is limited to the results obtained in instances of unilateral arthrosis of the hip joint, and those obtained in cases of congenital subluxation of this articulation. During the years 1949 and 1950, the approach to the joint was from the front and no attempt was made to correct the anteversion; nor was any attempt made to completely restore the shortened neck (cervicocephalic prosthesis). During the years of 1951 and 1952 these defects of technique were more or less corrected, and the patients operated upon during this latter period comprise the second group of immediate operative results. The results during the second period (1951 and 1952) were, of course, notably better.

A comparison of the two periods leads to the following conclusions: good immediate results depend upon an exact reconstruction of the anatomy of the hip joint. The author does not believe in making the acrylic head smaller than the acetabular cavity in order to favor greater postoperative mobility of the joint; the gain in mobility, if present at all, is insignificant and the postoperative course tends to be more painful. With the snugly fitting ball and socket structure, the articular equilibrium and the function of walking is better; finally, such a plastic structure ameliorates or relieves the pain. Less crippling, with regard to the immediate after function of these hip-joint plastics, is the Heuter incision and, ultimately, the approach to the joint from the posteroexternal direction as recommended by Gibson.

With reference to the late results, the author found in his material that the end results in most instances were good; however, in a small percentage of cases the results were not entirely satisfactory; and even more rarely, the condition appeared worse than it had been originally. The majority of unsatisfactory end results consisted of a deterioration in the functional, rather than the pain, component and the most frequent cause has seemed to be a resorption of the cervical stump of the femoral bone, or of the floor of the acetabulum.

The correction of these faults would seem to reside in the development of the proper protective type of prosthesis and in the correction of all deviations from the normal posture and relationships of the upper end of the femur. This repair should consist in the replacement of as extensive a portion of the femoral head and neck as is necessary to restore normal relationships (cervicocapital prosthesis) and the correction of any anteversions present, without the necessity of resorting to diaphyseal osteotomy. The resulting distribution of the pressure should be spread over as extensive a surface as possible and the tendency to bone resorption should be combated by placing (in over-varus, rather than over-valgus position) and fitting the prosthesis snugly in order not to limit the pressure to the upper border of the acetabular lip, and so as to forestall any loose play between the prosthesis and the bone canal into which it has been fitted.

In the discussion following d'Augigne's lecture, there seems to have arisen some difference of opinion between the discussants, Verbrugge and Delchef, as to the advisability of performing a total capsulectomy in these operations of arthroplasty of the hip joint. Verbrugge believed that a complementary total capsulectomy, especially in the possible presence of inflammatory processes in the serosa and en-

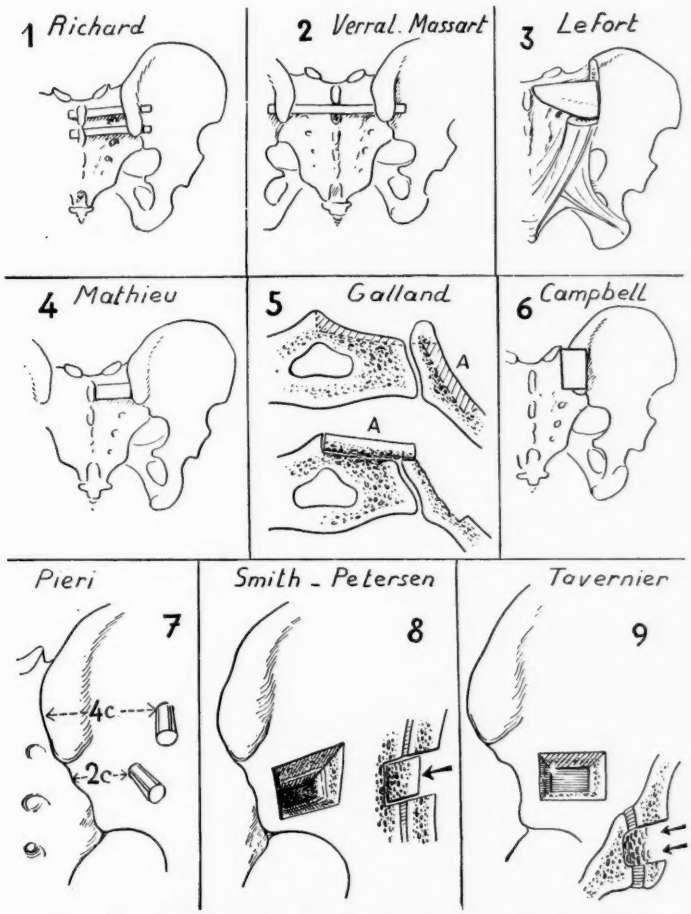


Fig. 1 (Sicard, Moulonguet). Various techniques of sacroiliac arthrodesis.

virons, prevents the excessive production of serous fluid during the healing period. Delchef, on the other hand, stated his belief that injury to the blood supply to the joint, incident to the extensive capsulectomy, might have something to do with the resorption of bone in the postoperative period. The author himself appears to adopt a rather conservative attitude which would seem to favor the viewpoint of Delchef.

Delchef mentions one of his patients who was operated upon by Walch, with use of the combined operation with the cup of Smith-Petersen and the acrylic prosthesis of Judet in the same joint. In this patient, the improvement in the function of motion in the joint was remarkable. Since that case was reported in detail at this same meeting by Walch himself, the discussant merely stated his belief that this combined method of operation offers one of the brightest hopes for the future of arthroplasty of the hip joint. JOHN W. BRENNAN, M.D.

Fusion of the Sacroiliac Junction (L'Arthrodese sacro-iliaque). ANDRÉ SICARD and ALBERT MOULONGUET. *J. chir.*, Par., 1953, 69: 485.

The authors state that the method of using two extra-articular bone grafts is simple and requires relatively short immobilization. It is indicated in the treatment of sacroiliac arthritis which is often associated with the lumbosciatic syndrome. In the presence of any inflammatory condition, a sufficient period of preoperative rest should be allowed for recalcification. The form of the sacroiliac joint is

not ideal for the counteraction of all the stresses of microtrauma. The protective ligamentous and capsule apparatus with its rich nerve supply accounts for the intense pain encountered.

Chronic degenerative rheumatoid arthritis and ankylosing spondylarthritis do not represent the main indications for the method. The authors believe these are the arthrotic changes due to trauma or faulty statics (ankylosis of the hip, scoliosis, and spondylolisthesis) as the obturator nerve and the lumbosacral nerve trunk are in close contact with the anterior portion of the sacroiliac junction.

The great number of extra-articular and intra-articular methods in use bears out the belief that no standard method is available. Nine different techniques are described (Fig. 1). The authors used the intra-articular fusion in 14 cases as a means of fusing the superior and inferior portions of the articulation. Two bone grafts from the ileum, 3 and 4 cm. long, respectively, are wedged into two deep grooves which makes postoperative plaster immobilization unnecessary. Ambulation is allowed after a month. ERNEST H. BETTMANN, M.D.

Tendon Transplantations in Median Nerve and Ulnar Nerve Paralysis. DANIEL C. RIORDAN. *J. Bone Surg.*, 1953, 35-A: 312.

The author describes a typical clawhand as one in which the long extensors and long flexors are functioning while the intrinsic muscles are paralyzed. When an attempt is made to extend the fingers the wrist must go into flexion. The proximal phalanges are hyperextended and the middle and distal phalanges are flexed to a varying degree. The principal cause of the deformity is the loss of power of the interossei and the lumbricales to flex the proximal phalanx. The unopposed pull of the long extensors on the proximal phalanges accounts for hyperextension at the metacarpophalangeal joint. This causes tension on the flexors with flexion deformity of the fingers.

The author emphasizes the concept of Fowler and Bunnell regarding the function of the long extensors and points out that if the metacarpophalangeal joints are stabilized at a position of 180 degrees in the claw hand, it is possible for the long extensors to act on the two distal phalanges. The author observes that patients with radial nerve paralysis are able to extend the distal phalanges. If the metacarpophalangeal joint is stabilized this effects replacement of the extensor component on the proximal phalanx only. In patients with intrinsic muscle paralysis immobilization of the metacarpophalangeal joint allows the long extensors to extend the two distal joints of the fingers completely. This proves that the long extensor has the power to extend the two distal phalanges if the proximal phalanx is not allowed to hyperextend. In some cases in which the metacarpophalangeal joint capsule is contracted, median and ulnar nerve paralysis does not cause clawing of the fingers because the metacarpophalangeal joints will not hyperextend.

The author states that the multiple sublimis tendon transplantation through the lumbrical canals into the aponeurotic expansion is indicated only in cases of clawhand which are of recent duration, because the patient with long-standing clawhand has a strong habit pattern of flexing the wrist to extend the fingers and this renders the sublimis transplants ineffective. The only successful operations for restoring finger extension in claw deformities of long-standing are those which limit flexion of the wrist while preventing hyperextension of the proximal phalanges, or those which will permanently limit hyperextension of the proximal phalanges regardless of wrist position.

The author considers the Fowler extensor transplantation to be a tenodesis type of procedure because its success depends on limiting extension of the metacarpophalangeal joint to 180 degrees or less. The author describes a tenodesis utilizing half of the extensor carpi radialis longus and half of the extensor carpi ulnaris to limit hyperextension of the metacarpophalangeal joints. This operation is indicated in cases in which the sublimis strength is insufficient for a Bunnell transplantation and cases in which the extensors are too weak to allow the use of the extensor indicis proprius and digiti quinti.

NORMAN J. ROSENBERG, M.D.

FRACTURES AND DISLOCATIONS

Open Reduction and Osteosynthesis of the So-Called Bennett's Fracture in the Carpometacarpal Joint of the Thumb. K.-O. GEDDA and E. MOBERG. *Acta orthop. scand.*, 1953, 22: 249.

Bennett (1886) described a fracture involving the basal intra-articular part of the first metacarpal bone in which more or less of the volar joint surface is displaced. Usually there is a radiodorsal subluxation of the joint.

The authors have adopted a new interpretation which is completely divergent from the previous one in regard to the fundamental lesion in Bennett's fracture. Basically, there is an injury with an avulsion of the ligament and its bony attachment which can involve a greater or lesser part of the

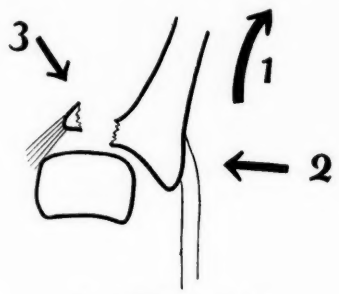
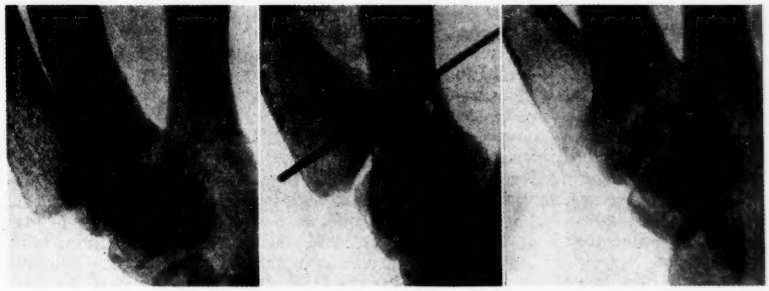


Fig. 1 (Gedda, Moberg).



a b c

Fig. 2 (Gedda, Moberg). a, Before operation; b, After operation; c, On follow-up examination.

joint surface. Dislocation or subluxation of the joint is prevented predominantly by the strong ligaments of the joint, primarily the anterior oblique ligament and secondarily the posterior oblique and the radial ligaments. The former is attached to the "hook." Rupture of this ligament occurs nearly always in such a way that a larger or smaller bone fragment is attached to the ligament. This piece constitutes the joint fragment in Bennett's fracture and can include a markedly variable part of the joint surface. In extreme cases it may take along practically all of the joint surface, but one may see examples in which the fragment is minimal. Rarely, one sees cases in which a ligamentous rupture without a bone fragment is accompanied by typical dislocation. The radial ligament and the related dorsal oblique ligament rupture most often without skeletal injury to the metacarpal bone. The fundamental injury is thus a rupture of the ligament with subluxation.

In the authors' technique for the anatomic restitution of the joint, one finds the line of fracture between the joint fragments on opening the carpometacarpal joint and, if necessary, the little piece can be loosened from the shaft with a small flat spatula. With a Kirschner wire inserted through the palmar skin and soft parts, the small fragment with its attached ligament can be caught and pierced. With the aid of a fine steel wire laid around the tip of the Kirschner wire so as to form a sling the fragment can be maneuvered into the position of exact replacement. When this is done, the Kirschner wire is bored on through the base of the metacarpal until it can be palpated subcutaneously. The fragments are pressed together, the small traction wire is removed, and the Kirschner wire is cut off subcutaneously on each side. Osteosynthesis is completed and the important ligamentous attachment is restored.

With this method 24 patients with a fresh Bennett's fracture have been operated on. Primary healing was obtained in all. In 2 cases no mentionable improvement in position was obtained, while in the majority a quite exact or much improved position was obtained and maintained with a corresponding functional result. The oldest case was seen 5 years after operation.

C. Fred Goeringer, M.D.

The Results in Fractures of the Wrist (Les sequelles des fractures du poignet). R. Soeur. *Acta chir. belg.*, 1953, 52: 231.

Early exact reduction of fractures of the wrist is essential. Delayed correction after a period of 1 or 2 weeks is considered unsatisfactory, although the functional results are fair. The criteria for satisfactory reduction are as follows: The telescoping radius must be corrected in order to avoid radiocarpal joint incongruity. If the angle between the longitudinal radial axis and its distal surface is less than 30 degrees it signifies that impaction has occurred. The dorsal silverfork-angulation must be completely corrected. If circulatory changes with impairment of finger motion occur, a new plaster cast, with the hand in dorsiflexion and minimal radial adduction, should be applied to restore the equilibrium of the intrinsic muscles. Sometimes, resection of the pseudarthrotic painful ulnar styloid is necessary. Marked radial impaction with elongation of the ulna was treated by resection of a short bone segment 3 cm. above the ulnar styloid, to create an intentional pseudarthrosis. Occasionally osteotomy of the radius with a transfixation screw through the distal third of the radius and ulna was employed. Osteosynthesis by means of intramedullary nailing rendered a good result in a case of nonunion of the radius.

Ernest H. Bettmann, M.D.

Fracture of the Anterosuperior Iliac Spine (Le fratture della spina iliaca anterior-superiore). G. Brunelli. *Policlinico* (sez. prat.), 1953, 60: 485.

Only 70 instances of this fracture have been reported, in only one case bilateral. The author therefore considers his report of 3 cases of fracture of the anterosuperior spine (one of them bilateral) to be justified.

The first case was that of a 17 year old student who, during a short foot race, felt a sudden violent pain, as though struck with a small stone, in the region of the left anterosuperior spine of the ilium.

The anamnesis disclosed that the patient had, some days previously, noted a similar attack of pain in the region of the right anterosuperior iliac spine. The roentgenogram disclosed an avulsion fracture of the anterior portion of the nucleus of ossification of the iliac crest corresponding to the anterosuperior iliac spine. On the right side the corresponding portion of the nucleus of ossification of the iliac crest appeared to be fragmented but not displaced. Treatment consisted of bed rest for 15 days, with the left thigh flexed and supported by cushions to relax the muscles attached to the avulsed spine on this side. Recovery was complete.

The second case was that of a 22 year old farmer who, in leaping from a moving conveyance, experienced violent pains in the region of the left anterosuperior iliac spine and fell to the ground. On palpation the region of the anterosuperior iliac spine appeared to be blunter than normal, and beneath the skin, 2 fingerbreadths distally, could be felt a firm, movable resistance which, when returned to the region of the anterosuperior iliac spine produced a typical crepitus of fracture. Roentgen films disclosed the detachment and marked displacement of a large fragment of bone containing the anterosuperior iliac spine. The fragment was fastened back in place with a screw. Subsequent roentgenograms showed abundant callus and perfect healing.

The third case was that of a 23 year old housewife who, while riding on a bicycle, was struck and thrown against a wall, the right flank striking the obstruction forcibly. There was violent pain in the region of the anterosuperior iliac spine. Later, palpation caused sensations of pain and the anterosuperior iliac spine appeared to be movable and evidenced crepitus. Active flexion and abduction of the right thigh was limited, and passive movements were painful. Roentgenographic examination disclosed a detachment of the right anterosuperior iliac spine with notable displacement of the fragment. At operation the avulsed fragment of bone was replaced and fixed with a Delitala nail. A plaster splint was applied with the right thigh flexed to approximately 80 degrees. Ten days later the cast was removed and after a period of 15 days the patient began to be up on her feet. Roentgenologic control 2 months later disclosed abundant callus and good consolidation; function was perfect.

The author hesitates to take sides in the dispute as to whether these cases represent true fractures or detachments of the epiphysis; in the 2 patients upon whom he operated, the conditions present were evidently true fractures. JOHN W. BRENNAN, M.D.

The Treatment of Acute Fractures of the Femoral Neck by Means of Acrylic Prostheses (Traitement des fractures trancervicales recentes du femur au moyen des protheses acryliques). ANDRÉ SICARD, LUCIEN LEGER, and ANDRÉ BRUEL. *Presse med.*, 1953, 61: 728.

The authors prefer the Hueter approach, under general anesthesia, in the management of severe fractures of the neck of the femur because it enables fast and good exposure of the joint without the need of enlarging the incision. With the leg in marked external rotation, the fracture, often diagnosed roentgenologically as transcervical, reveals itself as subcapital. After removal of the head with preservation of the neck, an acrylic prosthesis with the largest possible head diameter is chosen.

With the normal head length preserved, a Judet prosthesis is indicated; in shortening of the neck, a model with a prolonged base and a grooved margin is used. Gentle handling in driving in the prosthesis and adjusting it to the socket is important. The capsule should be preserved and resutured. With this procedure greater difficulties are encountered in arthritic hips and in ununited fractures with secondary adhesions.

The patient is able to sit up after the second week. The leg is kept in internal rotation and abduction, and quadriceps and patellar exercises are instituted. Early ambulation with 2 canes is started and after 1 month, only one cane is used.

The authors operated upon 70 patients, with a mortality of 10 per cent; thrombophlebitis developed in 6 cases. The high mortality rate is apparently due to the ages of these patients, as 38 were over 70 years of age. Anticoagulant treatment is suggested.

The results in 47 of the 70 cases are rated as good, with painless gait after 3 months. The failures were due to infected hematomas, inadequate reduction, marked osteoporosis, osteoarthritic changes, and thrombophlebitis.

The indications for the replacement prosthesis include cases in which bedsores would otherwise develop, along with other complications from prolonged bed rest. Replacement prostheses are indicated also in fractures which are difficult to reduce; in cases in which there is a possibility of pseudarthrosis (subcapital fractures), oblique fractures, and shifting head fragments; in patients with osteoporosis, or with marked preexisting osteoarthritic changes in which the prognosis is doubtful. The authors conclude that in the cases mentioned the replacement prosthesis is superior to the Smith-Petersen nailing which is accompanied by 20 to 40 per cent of failures. The advantages are: the short operation time, the short recumbency, and the avoidance of many follow-up x-ray examinations.

ERNEST H. BETTMANN, M.D.

Treatment of Recent and Old Fractures of the Astragalus (Sul trattamento delle fratture recenti ed inveterate dell'astragalo). S. BRANCIFORTI. *Chir. org. movim.*, 1953, 38: 184.

The author discussed recent and old fractures of the astragalus and stated that he believes that in spite of the great advances in operative technique the results obtained in treating these types of fractures are not always satisfactory.

After a detailed review of the mechanism and the pathologic anatomy of the fractures of the astragalus the author reports 83 cases, 40 of which were recent,

and 43 old, fractures treated in the Istituto Rizzoli of Bologna in a period of 50 years. Among the cases reported 53 per cent of the patients were between the ages of 20 and 40 years; 28.9 per cent were between 40 and 50 years. Males were more often affected, in the proportion of 3 to 1 female. The right astragalus was involved in 34 cases, the left in 46, and both astragali in 2 cases.

The author follows the classification of Tanton and states that in 6 of his cases the fracture involved the head of the astragalus, in 25 the neck, in 38 the body, in 8 the body and neck, and in 6 cases the apophysis.

He bases his observations on the follow-up of 35 of these cases for a period of 1 to 18 years, and concludes as follows:

1. The poor blood supply and the slow revascularization are responsible for the high percentage of aseptic necrosis, especially of the body of the astragalus, and in cases of transverse fracture of the neck or of the body with posterior dislocation of the distal fragment (as observed in 8 of his cases).

2. In fractures of the body or of the posterior apophysis without displacement, the prognosis is good if they are treated conservatively.

3. Early closed reduction should be tried in every case.

4. When closed reduction fails, osteosynthesis with Delitala's nail should be used. The author failed in the cases in which osteosynthesis was done with screws according to the technique of Tavernier and Polloson.

5. In the cases associated with subastragalar dislocation, other than open reduction of the fracture, an arthrodesis of the subastragalar joint should be done to obtain better function.

6. Triple arthrodesis should be considered as the best choice in the cases of comminuted fractures with serious damage to the articular cartilage.

7. The author claims no experience with astragalectomy, but is opposed to its use except in cases of severe infected comminuted compound fractures.

8. Astragalectomy may be indicated in old fractures, but better results can be obtained with subastragalar arthrodesis or by triple arthrodesis in the more severe cases. FELIX STANZIOLA, M.D.

ORTHOPEDICS IN GENERAL

The Pathology, Symptoms, and Therapy of Sudeck's Disease (Ueber pathophysiologie, Klinik und Therapie der Sudeckschen Krankheit. HANS MOSER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1953, 275: 124.

Sudeck's disease not only affects the bones but the soft parts of the affected extremities. The reaction is intimately associated with the autonomous nervous system. It may be caused by localized mechanical disturbances, or thermic, chemical, electrical, or actinic stimuli. The reflexes described by Hess control the blood flow in the periphery. Ricker demonstrated that a weak painful stimulus causes a dilatation of the arterioles. By increasing the stimulus a reflex contraction of the arterioles occurs which causes an ischemia of the extremity. By continuing the reflex a paralysis of the arterioles may occur. These changes are not only found locally but soon spread to other parts of the extremity. The ischemia causes lack of oxygen and the *p*H deviates toward the acid side. Fluid escapes into the surrounding tissues. The vessels and, with them, the blood supply to the extremity are controlled by the sympathetic nervous system. Under certain circumstances pain stimuli may also be carried by the sympathetic nervous system in cases in which the stimuli are persistently high and the perception of pain as well as the blood supply is controlled by the sympathetic nervous system.

There are 3 stages of Sudeck's disease. The first stage is characterized by acute hyperemia, a slight degree of swelling, and local heat. Active and passive motion in the affected joint are slightly impaired by swelling of the joint capsule. There is slight hyperhidrosis of the skin covering the area. The nails of the toes or fingers, respectively, show increased growth. At the beginning the x-rays of the bones reveal no abnormalities. At the end of the fifth to eighth weeks a spotty decalcification appears within the bones. In areas where the epihyseal line was originally located a band of decalcification appears. In cases in which the treatment is unsatisfactory the second stage of Sudeck's disease develops.

The second stage is characterized by dystrophy. The acute hyperemia is replaced by paralysis of the arterioles and by the appearance of an atonic type of hyperemia. The skin is cold, gray, and cyanotic. The edema of the skin becomes hard to palpation. The nails are dull and their growth is increased. The joints are painful, stiff; the capsule is thickened and contractures develop. The x-rays reveal thinning of the cancellous bone and thinning of the cortex. The first stage of Sudeck's disease may heal without leaving any after-effects. In the second stage of Sudeck's disease, atrophy may improve but it always leaves some sequelae.

The third stage of Sudeck's disease is characterized by dystrophy of all the tissues in the extremity. The skin is thin, wrinkled, and pale. There is occasional cyanosis, the edema has disappeared and pain has decreased to a great extent. The muscle power is decreased; atrophy is permanent and considerable in certain instances. The x-ray examination reveals atrophy which is characterized by a uniform picture of decalcification and may be misinterpreted as disuse atrophy.

The best treatment of Sudeck's disease is prophylaxis. The attempt should be made to eliminate pain and to immobilize fractured bone fragments satisfactorily. Pain is usually a symptom, not the cause, of Sudeck's disease. In the postreduction treatment of fractures, painful exercises and massage should be avoided. Active exercises should be encouraged. No phase of the treatment should cause

pain. Edema is to be avoided by elevation of the extremity. The first stage of Sudeck's disease does not require any specific treatment. In the second stage the treatment should attempt to interrupt the vicious cycle, which apparently is located in the ramus communicans albus and the sympathetic chain. This is accomplished by lumbar anesthesia, epidural anesthesia, conduction anesthesia of the spinal nerves, and by novocain or alcohol blocking of the sympathetic ganglion chain. In the lower extremities the block is accomplished at the second level of the second lumbar vertebra. It is important at the same time to eliminate all damaging factors at the periphery. Without it a blocking of the lumbar sympathetic chain will not be successful in the treatment of Sudeck's disease. In the upper extremity the stellate ganglion is blocked. The author uses 10 to 15 c.c. of a 1 per cent novocain solution for the upper extremity and from 20 to 30 c.c. of a 2 per cent solution for the paravertebral block at the level of L-2. As a general rule the block was done on the first, second, fifth, tenth, and fifteenth days after the diagnosis of Sudeck's disease had been made. Three cases are presented for illustration of the effectiveness of this treatment. Certain patients with a thyrotoxic constitution seem to be more susceptible to Sudeck's disease. Females were more often affected than men in a ratio of 13 to 7.

GEORGE I. REISS, M.D.

The Need for Basic Investigation in Orthopedic Surgery. FRANCIS M. MCKEEVER. *J. Bone Surg.*, 1953, 35-A: 285.

The author, on the occasion of his presidential address before the American Academy of Orthopedic Surgery, pointed out the adaptation of basic investigations by orthopedic surgeons, but decried the lack of basic investigation by the orthopedists themselves. Surveying the orthopedic literature appearing in the principal English language orthopedic publication, he found that of 753 articles published from 1947 to 1951 only 26, or 3.45 per cent, were based on animal experimentation. Half of these were not written by orthopedists.

He believes that this condition might be corrected by the establishment of chairs for orthopedic research in our medical schools and by placing more emphasis on basic research in the training of orthopedic surgeons. He believes that the responsibility lies with the American Academy of Orthopedic Surgeons, and the recommendations of the Committee for the Advancement of Orthopedic Surgery to create a lay affiliate composed of representatives from outside the medical field would be a proper beginning. NORMAN J. ROSENBERG, M.D.

Autographic Study of Bone Section in Vitro with Radiocalcium. (Il metodo di studio autografico di sezioni di ossa trattate in vitro con radiocalcio). RODOLFO AMPRINO. *Chir. org. movim.*, 1953, 38: 139.

The author reviews briefly the pathology of cortical and cancellous bone, giving his point of view on the subject. He disagrees on the possibility of demineralization of the living bone tissue and believes that this may be interpreted as a rebuilding of uncalcified bone rather than old bone which has lost its calcium salts.

He mentions his previous researches, in which he has shown by radioautographic methods that the degree of radioactivity of the different structures of basic sections of total bone treated with radiocalcium and radiophosphorus are intimately related to the relative age of the various bone structures. The fragments of new bone absorb a higher quantity of the radioisotope than the older bone basic substance. By this method he was able to study the progress of reconstruction of the secondary structures of bone.

In his present article he describes in detail a technique for the radioautographic studies of basic sections of fresh bone fixed in alcohol or in formalin, and dried bone treated with a diluted solution of radiocalcium. He found that secondary bone of adult cortex when treated in vitro with radiocalcium absorbs more radioisotope than the primary bone and that the amount of isotope fixed is related to the calcification of the fundamental substance, that is, the lesser the calcification the greater the fixation. During the growing period of the bone, the degree of calcification of the layers of the primary bone is less than that of the layers which have been laid down a long time previously. The latter are able to fix great quantities of radiocalcium. The calcification of the primary bone is uniform only after the growing period has ceased.

The author reports a few cases in which the rebuilding of cortical bone was studied according to his technique. The cases reported were of normal individuals and of patients whose bone structure rebuilding and calcium metabolism had undergone various degrees of abnormal changes.

The author concludes that this autographic study in vitro with radiocalcium is useful in experimental researches of the physiopathology of the skeleton to establish the effect of some conditions on the process of growing and the rebuilding of bones; these conditions were treatment with special diets rich or poor in vitamins, treatment with hormones, and removal or functional alteration of the endocrine glands. Finally, the study could be used with biopsy, not only as a complement to the histological examination, but whenever it is necessary to learn the regenerative capacity of the hemopoietic material of the recent newly formed bone. FELIX STANZIOLA, M.D.

Experimental Study of the Fate of Bone Grafts. CRAWFORD J. CAMPBELL, THOMAS BROWER, D. GLEN MACFADDEN, EDWARD B. PAYNE, and JAMES DOHERTY. *J. Bone Surg.*, 1953, 35-A: 332.

The authors have evaluated fresh autogenous and fresh homogenous, frozen autogenous and frozen homogenous, boiled homogenous, and os purum grafts. One hundred and forty-one split rib grafts were implanted into defects in the ribs of mature dogs. Osteogenesis was present only in

the fresh autogenous transplants. The osteogenetic surface was minimal on the cortical portion and maximal on the cancellous surface of the split rib graft.

Histological examination of the bone transplants showed that there was union of the cancellous portion of all grafts to the host bed in 2 weeks and the pattern of growth was similar in all grafts. Replacement was more prominent in fresh autogenous grafts, while absorption was predominant in preserved and boiled grafts. Osteogenesis in the cortical portion was noted only in the fresh autogenous grafts at the end of a 2 week period. Preserved and fresh homogenous transplants evoked a foreign body type of reaction consisting of dense fibrous tissue between the graft and the host.

NORMAN J. ROSENBERG, M.D.

The Calcium and Phosphorus Metabolism in Normal and Disturbed Healing of Fractures as Well as in Fresh and Bone Bank Bone Grafts (Der Calcium- und Phosphorstoffwechsel bei der normalen und gestoerten knochenbruchheliung sowie in frischen und konservierten transplantaten). HERMANN KARCHER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1953, 275: 1.

In the course of the author's experiment 1,600 measurements and 100 roentgenograms were taken of fractures of the femur, lower leg, and foot bones of 180 rats. It was found that in the first 3 days after the fracture the P^{32} content was decreased as compared with the unaffected contralateral extremity. On the fourth day there was a sharp increase of the P^{32} deposit. It reached its climax in the upper and lower leg on the ninth and eleventh days. The Ca^{45} content paralleled the P^{32} deposit but was somewhat slower. The maximum values were obtained on the thirteenth and fifteenth days. The increase was not only confined to the fracture site but also affected the rest of the involved bone and the adjacent bones.

In cases of late healing of the fracture, such as in pseudarthrosis, there was a considerable decrease of the isotope content at and around the fracture area. The author concluded that the single most important factor in the development of the pseudarthrosis was the disturbed formation of the bone matrix but not localized lack of calcium and phosphorus. The examination for substances often recommended to increase the speed of healing of fractures failed to reveal any increased deposit of the isotopes. In cases in which starvation was observed because of a decreased food intake, a decrease in the deposit of isotopes was found around the fracture site. An increase of the P^{32} deposit in bone grafts was found to reach its maximum between the twentieth and twenty-fifth days after operation. The increase of isotopes was still noticeable at the end of 4 months. The P^{32} deposits in homogenous bone grafts were somewhat less than in the cases in which autogenous bone grafts were employed; however, the P^{32} deposits were twice as much at the end of the fortieth day if compared with the unaffected extremity, a sign that the grafts were incorporated in the general circulation. In bone grafts which were taken from a bone bank where the bone was preserved at a temperature of 0° Celsius the P^{32} deposits were definitely less than in autogenous bone grafts. The age of the bone bank bone graft had no bearing on the P^{32} deposit.

GEORGE I. REISS, M.D.

Experimental Studies on Bone Grafts Conserved by Refrigeration (Étude expérimentale des greffes osseuses conservées par le froid). ANDRÉ SICARD and ROGER MOULY. *Presse méd.*, 1953, 61: 905.

The authors have previously (in 1950 and 1951, and in the same journal) published studies on 592 homogenous bone transplants taken from corpses and conserved by refrigeration at −18°C. (about 0°F.) after freezing at −35°C. (−31°F.) In this article they investigated experimentally (parallel to clinical observations) the differences between autogenous fresh and homogenous refrigerated bone transplants.

Twenty-five large young dogs were used since they present conditions which resemble those in man most closely. There was difficulty in immobilizing the limbs and a relative frequency of septic incidents even under penicillin medication. The first series of experiments with fresh diaphysis fractures failed for the first reason. The authors then used partial diaphyseal resection without interruption of the continuity of the bone. Pieces measuring 3 by 4 cm., comprising the full thickness of the cortex, were taken from the middle third of the tibia and replaced by a similarly obtained transplant. Operation was done in one session on both paws by transplantation of a refrigerated homogenous graft on one side and a fresh autogenous graft previously obtained by diaphyseal resection on the other. The dogs were then sacrificed between the fifteenth day and the end of the second month.

Fundamental studies on the condition of the refrigerated bone were done by some coworkers by 3 methods. Histological examination showed that after refrigeration of 5 to 18 hours few osteocytes retain their staining properties, and after 24 hours none remain. This is in contradiction to Herbert's investigation which showed complete identity of the refrigerated and fresh bone. The phosphatase activity was scarcely influenced by refrigeration. The ratio of the reactivation with magnesium to the activity without magnesium remained in the neighborhood of 1.5 even after 16 days. In vitro cultures of bone fragments in Carrel flasks showed growth of the fragments at a temperature of +4°C. (39°F.) as long as 15 days, while at −15°C. (5°F.) the fragments were dead within 8 hours. The authors concluded from these studies that it is possible to conserve the tissue architecture intact for assimilation, that the integrity of the phosphatase activity is an advantage, but that the bone appears biologically dead.

Macroscopic evaluation of the surgical results revealed an identical full consolidation after 2 months in both groups. However, the union was obtained much faster with fresh bone, which showed a firm mechanical fixation and a dense connective tissue wall on the fifteenth day. The refrigerated bone at this time could still be lifted easily out of its bed and showed only a narrow seam of connective tissue at the contact area. Microscopic studies (15 good photographs accompany the text) proved that regeneration is accomplished in both groups by the same mechanism. The three classical steps for bony union are: the organization of the hematoma, the deposition of osteoids, and the penetration with conjunctivovascular elements. The presence or absence of the periosteum did not influence the results.

Studies on the bone matrix were done with the glucoprotein-specific Schiff stain. Both transplants stained well even after decalcification, but much less so than the new-formed bone. The conserved refrigerated bone showed much less participation of the connective tissue, less staining of the polysaccharides, and much less cellular activity at the area of contact after 15 days than the fresh bone. It is postulated by the authors that the osseous substance somehow interferes with ossification because of a yet unknown factor. The bony reconstruction seems to depend on a metamorphosis of the matrix, probably by polymerization of glucoproteins or connected with a secretion of the mesenchymal cells. W. D. BERGMANN, M.D.

Tenth Anniversary Number in Honor of Victor Putti

(Giornate commemorative in onore di Vittorio Putti nel X anniversario della morte—31 ottobre—1–2 novembre, 1950). DELITALA, F., OTTOLENGHI, C. E., BONOLA, A., COLOMBANI, S., and others. *Chir. org. movim.*, 1953, 38: Nos. 1, 2.

This occasion, marked especially by the unveiling of a bust of Putti, done in white marble by the Florentine sculptor Berti and presented to the Rizzoli Institute by Putti's family, was honored by the attendance of the great surgeon's family, by his former associates, assistants, and pupils. by members of the faculties of other Italian and foreign universities (particularly of South America), by many high government officials, and, finally, but not the least impressive, by a large concourse of the late professor's patients.

The South American delegation, consisting chiefly of Putti's former pupils and assistants from that land, presented a memorial plaque, and the delegation's leader, Ottolenghi, completed the presentation with an address in which he expressed appreciation for the generosity of his late professor in his many trips abroad, at which time he so enthusiastically lent his experience and his organizational genius in behalf of foreign institutions. Here it may be mentioned that Putti was not only a close friend of Harvey Cushing and an ardent collaborator with this brain surgeon in the study of the history of medicine, but Putti actually traveled to Boston and worked for a time in the institutions there.

Bonola, medical historian at the University of Modena, pointed out the artistic and bibliographic activities of Rizzoli's former director. His immense collection of medallions and books were presented to the institute which was so long under his direction, and will be there at the disposal of the medical profession. Putti spared no expense in acquiring rare books and medallions of physicians and surgeons of the past ages, particularly the books and trophies of the surgeons of the Italian Rennaisance—Vesalius, Berengaria da Carpi, Malphigi, Gugliemo da Saliceto and others who, in any way, concerned themselves with the science of orthopedics or its ancillary sciences. When Putti heard of a rare edition, anywhere in the world (Megs of London) or by any of his favorites, he spared no expense, time, or effort in procuring it. He sought, particularly, to bring back the early books of Italian authors to their native land. Yet Putti did not inherit wealth; his manner of living and his lavish expenditures for rare works of art and rare editions were accomplished with what he had earned himself.

Colombani spoke of the "Master's" efforts to make a differential diagnosis, roentgenologically and clinically, between osteosarcoma and the more benign types of bone tumor. Delitala showed that his conceptions with regard to the role played by apophyseal arthritis in the causation of sciatic pain are still largely valid, despite the present day domination of the picture by the discovery of the herniated disc. Prampero discussed the enthusiasm of the orthopedist in the amelioration of suffering incident to deformity and loss of function, which rose to such a height as to cause him to demand that the treatment of fractures be included within the province of the orthopedic surgeon. Mancini discussed Putti's addition of the osteotomy of the clavicles to the scapulopexy of von Eiselsberg for such myopathic sufferers as the victims of postanterior poliomyelitis, in order to obviate the neurovascular sequelae of the consequent pressure of the clavicles on the neurovascular bundle passing beneath these structures.

Putti's greatest fame seems to rest on his invention of the Putti screw in the treatment of fractures of the head of the femur, which he thought would more firmly approximate the bone ends than a nail and would thus result in a more rapid and more reliable process of consolidation. However, there are few fields of orthopedic surgery, including fractures, in which his passion for experimentation and for improvement of standard methods has not left their impress.

Most impressive were the Master's intensity of artistic passion, his dissatisfaction with the status quo, and his ready rejection of everything that spoke of fixed doctrine, of tradition, and of smug self-satisfaction with, or fanatical attachment to, a single method of treatment. Although basically a surgeon, Putti demanded that everything be tried which

might contribute to the amelioration of the sufferings of the patient; thus he was largely instrumental in the development of the heliotherapeutic and physiotherapeutic institution at Cortina-d'Ampezza, and of the nonsurgical treatment of bone and articular tuberculosis. In everything he was broad-minded, enthusiastic, and dynamic. It is to be regretted that Putti lived only to witness the dawning of the antibiotic era; with such powerful aids for the conquest of infective processes the fertile mind of the master would have risen to unpredictable accomplishments. JOHN W. BRENNAN, M.D.

Problems of Postoperative Position and Motion in Surgery of the Hand. JULIAN M. BRUNER. *J. Bone Surg.*, 1953, 35-A: 355.

By means of excellent illustrations and case reports, the author reviews the proper postoperative positions of the hand and wrist, and comments on the means of obtaining motion postoperatively. The anatomical considerations in the positions of rest and function are described, and it is pointed out that the degree of flexion of the wrist is inversely proportional to the degree of flexion of the digits when the hand is at rest, and that the wrist joint "calls the tune" in regard to the position of the digital joints.

He calls the position of function a compromise between the most useful position of the hand and the position in which some joint stiffness would still allow a useful range of motion. The importance of some flexion of the metacarpophalangeal joints is emphasized. The position of function is indicated in burns, infections, and cases of severe trauma, and each hand deserves a tailor-made splint of metal or plaster. The position of flexion is indicated after suture or graft of the flexor tendons in order to relieve tension at the suture lines. When it is essential to flex the wrist or fingers acutely because of loss of length of a nerve or tendon, this position should be eased as soon as possible. Often the loss of nerve function should be accepted in order to keep the joints mobile. Usually moderate flexion is sufficient following primary suture. Active motion is begun after 21 days.

The position of extension is described and is indicated following suture of the extensor tendons or branches of the radial nerve. While the wrist should be kept in moderate dorsiflexion, it is important that the metacarpophalangeal joints be in a position of about 5 degrees of flexion. If the suture line is proximal to the metacarpophalangeal joints, a position of 20 or 30 degrees of flexion in the interphalangeal joints is indicated.

The question of movement in uninvolved digits is solved anatomically. If a single flexor tendon is sutured, the immobilization of the adjoining digits is dependent on the excursion of the adjacent flexor tendons. After suture of the extensor tendon on the dorsum of the finger, the involved digit is placed in extension at 175 degrees. The distal joint should be allowed slight flexion and this will afford the remaining fingers some motion. Adequate motion for uninvolved fingers is helpful in promoting the return of the general circulation in the hand. NORMAN J. ROSENBERG, M.D.

The Late Results of Volkmann's Contracture (L'avenir éloigné de la maladie de Volkmann). A. TRILLAT and G. COQUET. *Lyon chir.*, 1953, 48: 385.

In the course of 15 years 8 cases of Volkmann's contracture were studied.

A bone shortening together with muscular fibrosis and tendinous shortening always occurred in chronic cases. Later circulatory and neurological changes are rare.

In spite of marked anatomical changes the functional outcome has not been too disappointing. However, the partial disability as such does not change in the course of the years.

Of the treatment methods used, the transplantation of tendons and resection of bone seem to give the best late results. ERNEST H. BETTMANN, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Vascular Injuries (Traumatismos vasculares). PAULO SAMUEL SANTOS. *Rev. brasil. cirurg.*, 1952, 24: 709.

The author reviews in great detail the complex problems associated with vascular surgery. Injuries caused by surgical accidents in hurried control of hemorrhage from torn saphenous veins, or inadvertent ligation of the femoral artery in femoral hernia repair came to the attention of the author. Other injuries caused by street accidents, knife wounds, gunshot wounds, subluxations, and compound fractures are reviewed.

Although the author is aware that oscillography, oscillometry, thermocouple cutaneous temperature testing, phlebography, and arteriography are available for diagnosis, in most instances definitive surgery discloses the extent and kind of vascular damage. Suturing of vessels end-to-end or end-to-side may be done, although the former is preferred, and either continuous or interrupted No. 000 to No. 000000 silk sutures on an atraumatic needle may be employed, which yield equally good results if the intima is properly approximated.

Avoidance of tension is paramount, the author releasing the vessel for a considerable distance and, if necessary, sacrificing the collaterals to attain slack apposition. In instances of arterial hematomas due to incomplete rupture of the artery, the author advocates temporary ligature control above and below the tear and suture of the latter. In cases of loss of arterial segments, replacement with autogenous or preserved grafts was done; in some instances vitallium tubes or absorbable fibrin tubes were thought to be valuable adjuncts to the graft. Large doses of papaverine, sympathetic blocks, sympathectomy, and sympathicoganglionectomy were all employed according to individual needs as ancillary measures to vascular surgery.

MIGUEL DROBINSKY, M.D.

Traumatic Pseudoaneurysm of the Subclavian Vessels Successfully Operated Upon (Pseudoaneurisma traumatico della succlavia operato con successo). A. M. DOGLIOTTI. *Bol. Soc. piemont. chir.*, 1953, 23: 128.

A case is presented in which the patient was struck by a pistol shot at the junction of the internal and middle thirds of the clavicle. The bullet traversed the clavicle, the large intercostal vessels, and penetrated the right lung, lodging in the upper lobe of the right chest. At the time of admission, the patient had no right radial pulse, and had severe hemothorax. He was treated conservatively. After a month's time he developed a mass, approximately the size of a nut, in the right supraclavicular area. The mass pulsated synchronously with the pulse. The patient experienced paresthesia in the right upper extremity. He was admitted with the diagnosis of posttraumatic pseudoaneurysm. At the time of admission the aneurysm was the size of a hen's egg with a tendency to rapid enlargement in size. The arteriogram revealed a round, radiopaque structure communicating with the subclavian artery.

A right anterior thoracotomy at the second interspace was performed. The right subclavian artery was identified and a tourniquet type of ligature was passed around the artery at its origin, to produce temporary constriction in an attempt to lower the pressure in the artery. Following this, a supraclavicular incision was made and the clavicle was sectioned, exposing the pulsating mass. The mass was filled with coagulated blood. The author states that he had had no illusions about controlling the hemorrhage, since a more than adequate collateral circulation had developed. In order to control hemorrhage after excision of the mass the subclavian artery was ligated in the depths of the wound, after sectioning the scalenus anticus muscle. In spite of all these precautions he found that hemorrhage was still difficult to control. The patient was discharged in good condition with adequate collateral circulation nourishing the extremity.

FRANK W. PIRRUCELLO, M.D.

Thromboembolic Phenomenon; A Local Process with Regional Spread and Systemic Complications. MIMS GAGE. *Ann. Surg.*, 1953, 137: 577.

The author summarizes 5 epochal contributions on thromboembolic phenomena which were made in the last 50 years. These are (1) the division of intravenous clotting into its two types, (a) phlebothrombosis, which is responsible for 90 per cent of the embolic complications and (b) thrombophlebitis; (2) the recognition of the thromboembolic sequelae of thrombophlebitis from superimposed phlebothrombosis; (3) the ligation of the superficial femoral veins in nonfatal infarction; (4) the ligation of the inferior vena cava in ileofemoral phlebothrombosis, phlebothrombosis complicating thrombophlebitis and suppurative pelvic thrombophlebitis; and (5) the addition of the anticoagulants in preventive and curative therapy.

The incidence of thrombosis and embolism fluctuates with wavelike periodicity, which is reflected in various statistics over a period of years, and any prophylactic measure instituted in routine fashion during relatively immune years might be considered of great value, when in reality it has played no important part in this immunity. Postmortem studies show that fatal pulmonary embolism is not diagnosed clinically in about 60 to 75 per cent of the cases. It is the author's belief that intravenous clotting is an entirely local process with regional spread in fatal or nonfatal systemic complications. This is true not only of thrombophlebitis and phlebo-

thrombosis but of suppurative thrombophlebitis as well. No single etiologic factor is responsible for intravenous clotting. but rather a constellation of factors. Among the factors which are considered contributory to the development of thromboembolic phenomenon are (1) age, over 80 per cent of the patients are more than 40 years old, (2) pre-existing thrombosis in the veins of the lower extremity; this has been found in over 50 per cent of autopsy series, and (3) slowing of the blood flow, which predisposes to sludging of the blood. The author believes that most cases of thromboembolic phenomena are the result of a pathologic process added to a pre-existing healed thrombosis.

Intravenous clotting may be separated into three types. These are phlebothrombosis which is a thrombosis of a bland type, thrombophlebitis in which the thrombus originates on the venous wall and is therefore immobilized and in which event an embolus occurs only rarely and is then due to an added thrombosis above the area of thrombophlebitis, and suppurative thrombophlebitis. The clinical manifestations of these various types are reviewed, as well as their diagnosis.

Treatment of the condition is both prophylactic and curative.

Definitive treatment consists in trapping the clot at its local area of origin. This is accomplished by vein ligation proximal to the thrombus, the administration of anticoagulants to stop thrombus formation, and the intravenous use of highly purified trypsin to dissolve the clot. The treatment of intravenous clotting is first preventive. Prophylactic measures are directed toward increasing the blood flow in the lower extremities in order to prevent stagnation and sludging of blood which predisposes to the development of thrombosis.

Immediately after operation the patient should be placed in bed with no pillow beneath the head or knees. It would probably be advisable to elevate the foot of the bed to increase the blood flow in the veins. The legs, thighs, and feet should be passively moved at frequent intervals until the patient has regained consciousness sufficiently to exercise his legs. In addition, the patient should be made to change positions frequently and breathe deeply. Early ambulation is advisable and this means actually walking.

Once the diagnosis of phlebothrombosis is made the treatment can consist of ligation of the vein proximal to the clot and the use of anticoagulants. If the thrombus is extended beyond the external iliac into the common iliac vein it is probably best to ligate the common iliac or inferior vena cava. Embolism may still occur and therefore it is best to begin anticoagulant therapy, for which heparin is the drug of choice.

If a benign nonfatal pulmonary embolus occurs in the course of treatment of acute thrombophlebitis, the vena cava should be immediately ligated, after which anticoagulant therapy should be instituted.

LEROY J. KLEINSASSER, M.D.

Aortic and Iliac Pathology as Seen by Means of Aortography (Patologia dell'aorta e delle iliache alla luce della indagine aortografica). GIOVANNI MARCOZZI. *Ann. ital. chir.*, 1953, 30: 93.

The author describes the technique of aortography with his own modifications. He illustrates normal findings as obtained with high and low aortic injections as well as the findings of acute embolic thrombosis and of chronic obliterations.

Particular attention is given to the development of the collateral circulation in aortic and iliac obstruction.

The illustrations are reproduced by a special method in relief which gives a three dimensional appearance; the author is the first to use this method in the field of aortography.

LUCIAN J. FRONDUTI, M.D.

Progressive Constrictive Occlusion of the Aorta with Wiring and Electrothermic Coagulation for the Treatment of Arteriosclerotic Aneurysms of the Abdominal Aorta. ARTHUR H. BLAKEMORE. *Ann. Surg.*, 1953, 137: 760.

In the last two decades, arteriosclerosis has replaced syphilis as the most common etiologic factor in aortic aneurysms. Several references are reviewed to stress the high mortality and poor prognosis for patients with aortic aneurysms, including those patients who are completely symptom-free at the time of diagnosis.

Pathologically, the process in the aorta is characterized by widespread deposits of cholesterol, with resultant fibrosis and degenerative changes. The yellow elastic fibers are destroyed and the abdominal aorta becomes a dilated, rigid tube. As the vessel dilates, the wall becomes thinner and weaker. The tendency of such an aorta to rupture suddenly is explained on the basis of areas of cholesterol degeneration and lack of blood supply to the sac wall. Secondary sacculations have frequently been observed budding from the primary fusiform aneurysm. Elongation of the aorta also occurs, and since it is relatively fixed at the hiatus in the diaphragm and at its bifurcation, tortuosity must ensue. This tortuous course removes the aorta from its close relationship with the vertebrae, which accounts for the scarcity of cases in which severe pain is caused by bone erosion.

Large arteries distal to the aorta are also involved in the arteriosclerotic process and, like a lead pipe, tend to develop partial obstructions at points where they are angulated. This partial obstruction results in a "water-hammer" effect in the terminal abdominal aorta, another feature in the development of aneurysms in this area. These features are noticeably absent in the patient with syphilitic aortic aneurysm.

When rupture occurs in an arteriosclerotic abdominal aneurysm, death is usually not sudden. More often than not, death does not follow for an interval of several hours to several days. Thus, it is evident that there is time for surgical intervention if a promising enough approach can be developed to

warrant such a course. Thirty-two cases are presented in which abdominal aortic aneurysms were treated by wiring and electrothermic coagulation, with banding of the proximal aorta.

The technique and principles of electrothermic coagulation are reviewed. A 10-meter length of No. 34 gauge insulated coin silver wire is looped at its center and this center portion is introduced into the aneurysm through a special needle, the two ends protruding. Several such segments are introduced, and then with a 100 volt direct current, the wires are heated to between 80 and 83° C. for 1 or 2 ten-second periods. This causes a protein coagulum to form on the wire in those parts of the aneurysm where the blood flow is relatively slow. Where the current is fast, the blood cools the wire sufficiently so that clotting does not occur.

This principle applies to both saccular and fusiform aneurysms, for in the latter the flow is usually fastest through the center, so that coagulation is limited to the peripheral portion of the lumen. Placing a constricting band about the aorta proximal to the aneurysm slows the blood flow, which enhances the coagulation effect, so that fewer segments of wire are needed. Wide rubber bands are used for this purpose, with several layers of polythene film containing dicetyl phosphate between the rubber and the aortic wall. This material induces fibrosis and thus tends to prevent necrosis. Proper adjustment of the constricting band to the correct diameter is important and difficult, for certain degrees of constriction narrow the lumen without decreasing the flow, and the obvious increase in rate of flow through the constricted area results in undue "jet-strain" on the aneurysm. Diameters to which the aorta was constricted varied from 8 and 12 mm. in the earlier cases to 3 and 5 mm. in later cases. The latter constriction to a very small diameter is performed in hopes that subsequent fibrosis will result in a delayed complete closure of the aorta. This would be the ideal, for eventual complete occlusion of the blood flow through the aneurysm is the only sure way of permanently inactivating it. One-stage complete occlusion often produces drastic results. Thus, although a delayed closure may be obtained in some cases, all of the patients are warned that a second procedure might be necessary. This is performed after there has been adequate time for a good collateral circulation to develop, and complete occlusion of the aorta then causes no further ill effects.

In the series of 32 cases reported, 7 patients died postoperatively, 4 died subsequently of other causes, and 6 died of rupture of the aneurysm during the follow-up period. Of the 7 postoperative deaths, 2 were from postoperative rupture of the aneurysm, which made a total of 8 patients who died of the complication which the procedure was designed to prevent. All 8 failures were the result of complications of the banding process. Five were caused by undue "jet-strain" from inadequate constriction, and 3 were due to rupture at the site of the banding in cases in which the band had been placed about the upper pole of the aneurysm. The latter complication is due to weakening of the wall by fracture of the calcific plaques as the redundant wall is folded in during constriction. To avoid this complication, a special clamp has been devised which constricts the aorta in a "curvilinear" fashion and eliminates the excessive wrinkling and folding in the cases in which the constriction must include the upper portion of the aneurysm.

It is significant that of the 6 patients dying in the follow-up period, 5 were in the early part of the series when experience was still wanting in the proper adjustment of the constricting bands.

It is recommended that all patients with arteriosclerotic abdominal aortic aneurysms be evaluated for surgery, because the incidence of rupture was less (25%) in this surgical series than in the cases treated by medical management (63.3%).

STANLEY W. TUELL, M.D.

Successful Resection of Aneurysm of Thoracic Aorta and Replacement by Graft. MICHAEL E. DE BAKEY and DENTON A. COOLEY. *J. Am. M. Ass.*, 1953, 152: 673.

Procedures for the surgical treatment of intrathoracic aortic aneurysms can be classified as follows: (1) those designed to promote thrombosis and fibrotic organization of the process by ligation, introduction of foreign material or periarterial fibroblastic reaction; (2) endoaneurysmorrhaphy; and (3) extirpation of the lesion with or without restoration of the blood flow through the parent vessel. The procedure of choice is extirpation of the diseased part and restoration of normal function, but this has been successfully accomplished in only a relatively small number of cases of sacciform aneurysm or aneurysms associated with coarctation. No reports of its successful use in fusiform aneurysm of the thoracic aorta were found by the authors who report a case of syphilitic aneurysm of the descending thoracic aorta which was resected, with restoration of normal blood flow, with an aortic homograft.

The patient was a 46 year old white male who complained of severe lower abdominal and inguinal pain for 3 months. He had been treated for lues; the Kahn test was doubtful and the Kalmer, negative. X-ray study of the chest revealed a large pulsating mass behind the heart, with extensive erosion of the bodies of the ninth to twelfth thoracic, and of the first lumbar vertebrae. Aortography was done through a catheter in the left brachial artery, which was threaded into the midthoracic aorta and the aneurysm was demonstrated. Under endotracheal anesthesia the chest and abdomen were entered through a thoracoabdominal incision in the bed of the ninth rib. The proximal and distal aorta was clamped after the injection of heparin, as was the celiac axis, and the aneurysm was partially excised to allow room for the homograft which had been obtained 6 days preoperatively from a 21 year old negro who had died of acute injuries. The graft was sutured to the cut ends of the aorta, the lesion was excised, and the

intact intervertebral cartilages were left protruding into the space occupied by the aneurysm. The omentum was brought up and sutured about the graft. The patient made an uneventful recovery.

Extirpation of the sac is imperative in order to avoid secondary hemorrhage from the devascularized aneurysm. Other complications to be watched for are renal or spinal cord damage due to occlusion of the aorta, although in the reported case the aorta was clamped for 45 minutes without evidence of these lesions, probably because the collateral circulation was sufficient. Two cases with shorter periods of occlusion and partial paraplegia are cited.

The authors make the following recommendations: delay total excision of the sac until after the anastomosis is established; inject heparin into the distal aorta prior to occluding it, and use a simple through and through suture to facilitate the anastomosis. ALBERT M. SCHWARTZ, M.D.

Some Effects of Cortisone on Aortic Grafts. J. R. BARBERIO, JAMES W. PATE, PHILIP N. SAWYER, and C. A. HUFNAGEL. *Surgery*, 1953, 33: 827.

The practicability of homologous arterial transplantation has been demonstrated experimentally; however, about one-fifth of the transplants show unsatisfactory results. The failures have been due to varying degrees of intimal degeneration, to thrombosis, to inflammatory response with deposition of fibrous tissue, and to rupture of the graft site. These complications occur more often with the use of homologous grafts than with autografts. Antigens of individual specificity may possibly contribute to the increased incidence of complications in homologous aortic transplants. Since cortisone is believed to decrease the antigenic response of many tissues, notably connective tissue, a study was undertaken to determine the effects of cortisone on aortic homografts in dogs.

Fresh and frozen aortic homografts were implanted in 21 dogs. Ten animals received cortisone and 11 were used as controls. In the cortisone-treated animals, the mortality rate was increased. They showed less connective tissue reaction, grossly and microscopically. There was also subjective evidence of decreased healing. Cortisone had no effect on the frequency or extent of thrombosis in the grafts. The rate of re-endothelialization was apparently normal. Condensation of the elastic fibers and degeneration and phagocytosis of the graft muscle cells were reduced.

Under the conditions of the experiment reported, cortisone exerts little, if any, beneficial effect on aortic homografts. SAMUEL KAHN, M.D.

Discussion of the Pathogenesis and Surgical Treatment of Bifurcation of the Aorta (Réflexions sur la pathogénie et le traitement chirurgical des oblitérations du carrefour aortique). P. VAN DER LINDEN. *Acta chir. belg.*, 1953, 52: 258.

Observations on 15 patients with occlusion of the bifurcation of the aorta have induced the author to assume a conservative attitude toward this condition because its spontaneous evolution compares favorably with the postoperative results. The curative effect of surgical intervention cannot be judged by temporary amelioration, but should be appraised on the basis of follow-up examinations over a long period of time.

In 3 patients, after resection of the involved segment combined with unilateral or bilateral sympathectomy, transient improvement was followed by aggravation of the symptoms. In 2 other patients the procedure was employed recently and therefore no conclusion can be drawn as to its effect. In 1 patient a considerable amelioration was still present 2 years after a high bilateral sympathectomy. One patient who underwent a low unilateral lumbar sympathectomy succumbed to acute gangrene of the lower extremity on the same side.

Three types of occlusion of the aorta may be distinguished: embolism, occlusion following local stenosis, and occlusion secondary to a lesion extending from the iliac or femoral artery.

Embolectomy is indicated if an embolus is diagnosed. Isolated occlusion following local stenosis yields better results after surgical intervention than other types of occlusion, while the effect of the operation in the third type is rather illusory. In certain cases bilateral lumbar sympathectomy may furnish as good results as resection of the occluded segment. JOSEPH K. NARAT, M.D.

Leriche's Syndrome; Resection of Bifurcation of the Aorta; Results After 2.5 Years (Syndrome de Leriche; résection du carrefour aortique; résultat après deux ans et demi). JEAN CAHEN. *Acta chir. belg.*, 1953, 52: 247.

Leriche's syndrome, a relatively frequent condition with insidious onset, should be kept in mind when arterial disorders of the lower extremities are combined with sexual impotence. The diagnosis can be confirmed by aortography.

Three types of operation are considered. High gangliectomy or bilateral lumbar sympathectomy may produce good results, but these methods have been replaced by resection of the bifurcation of the aorta, disobliterating endarteriectomy, or arterial graft.

It is obvious that the aorta, invaded by atheromatous plaques or calcareous deposits, is not a good object for arterial suturing. Endarteriectomy is especially indicated when one of the iliac arteries is involved but the bifurcation of the aorta is not completely occluded. Resection is indicated if calcareous deposits are so extensive that dissection cannot be carried beyond them. If compensatory circulation is satisfactory, good results may be expected.

Thrombosis of the bifurcation of the aorta was diagnosed in a man, aged 51, with a typical Leriche's syndrome: cramps, fatigue, and atrophy of both lower extremities, pallor, absence of pulsation of the femoral and dorsalis pedis arteries, and sexual im-

potence. Two and one-half years after aortectomy the patient was in perfect health; his extremities were warm, the gait was not impaired, and erections reappeared. JOSEPH K. NARAT, M.D.

Fluorescein After Exercise: A Method of Investigation in Peripheral Arterial Diseases. B. EJRUP. *Angiology*, 1953, 4: 253.

A relatively simple method for determining the degree of arterial insufficiency in cases of intermittent claudication is described. It is based on the use of fluorescein, which has been previously employed in evaluating the viability of intestinal loops, in burns, and in studying the arterial circulation time in extremities with peripheral vascular disturbances (Allan, Barker, and Hines). The drug is nontoxic, although a few cases of individual sensitivity have been reported.

The test is performed, with the patient horizontal, by raising an intracutaneous wheal on the dorsum of each foot with 0.1 c.c. of 1 to 1,000 histamine solution and then having the subject run up and down a 3 foot step ten times. As soon as possible after the patient is lying down, 3 c.c. of a 10 per cent fluorescein sodium solution is injected intravenously in 1 to 2 seconds. The room is darkened and the time noted up to the onset of yellow fluorescence in the wheals, as well as full fluorescence under ultraviolet light.

Exercise oscillography was also done for comparison with normal individuals in the series reported by the author, which comprised 24 cases of peripheral vascular disease of the lower extremities. In tests at rest on normal feet, the wheals became fluorescent quite rapidly (20 to 40 seconds), while in feet with impaired circulation there was a delay (40 to 60 seconds). In exercise tests on normal extremities the wheals filled and became fluorescent rapidly (15 to 35 seconds), while in pathological ones there was marked prolongation (from 1 to 18 minutes).

The retardation of fluorescence in the wheal was interpreted as follows: during exercise the peripheral resistance in the working muscle decreases and the pressure falls to that in the afferent artery to the muscle and the vessels communicating with it. This fall in pressure is particularly pronounced and persists longer when obliterations are present. The maximum circulatory capacity is speedily reached, and the exercise will, relatively speaking, be supermaximal for the poorly vascularized muscle. Following exercise, equilibrium is reached in normal cases within the first minute. In cases with organic vascular changes, this does not occur so rapidly; the metabolism of the muscle requires dilated arterioles for a longer time, and a low peripheral resistance persists until the metabolism has been restored and any pathologic products of metabolism have been transported away. In severe cases this may be delayed 10 to 15 minutes or more, and throughout this time the pressure remains low in the afferent artery and the vessels communicating with it which are peripheral to the stenosis. The tissue pressure in the wheals is approximately the same at rest and after exercise. When the pressure in the surrounding tissue falls markedly in pathological cases and remains low for several minutes, the dye from the adjacent vascular bed is unable to enter the wheal until the pressure has approximately reached the rest value.

The author recommends the fluorescein test in the diagnosis of peripheral arterial obliterations and in the differential diagnosis of functional disorders.

ALBERT M. SCHWARTZ, M.D.

Primary Repair of Major Arterial Injuries. MAJOR EDWARD J. JAHNKE, JR., and CAPTAIN JOHN M. HOWARD. *Arch. Surg.*, 1953, 66: 646.

There is a reported incidence of injury to a major artery in 1 per cent of all battle casualties, and 20 per cent of amputations result from vascular injuries. The present report is a study of the value of primary arterial repair in forward field Army hospitals. The lapse of time after being wounded to the time of repair varied from 3 to 48 hours in successive cases. Débridement followed by end-to-end suture was employed in most cases. In 8 patients an autogenous vein graft was necessary to bridge the defect.

Before exploration of the wound an attempt was made to control the vessel suspected of injury. The severed vessel was then débrided of traumatized tissue. To obtain length, collateral circulation was sacrificed. Before actual suture with everting mattress sutures, the adventitia was stripped from the severed ends and blood was allowed to escape, to remove clots. To bridge defects, a segment of cephalic or saphenous vein was used. Spasm of the vessel was a problem in several instances, but this was alleviated by wrapping the vessel in a sponge soaked with 2.5 per cent papaverine hydrochloride. Anticoagulant therapy was not used.

Among 58 primary repairs there were 6 failures. The majority of these were apparently due to irreversible changes as a result of time lapse. Thrombosis at the suture line was the second most important cause of failure. Primary anastomosis is less favorable after a lapse of 8 hours. The amputation rate in this series was 10.3 per cent as compared with an amputation rate of 49 per cent in World War II. The ligation of major vessels may not lead to amputation, but rather to vascular insufficiency in the extremity. This does not occur with primary anastomosis.

RICHARD L. LAWTON, M.D.

Experimental Contribution to the Study of Methods of Surgical Treatment of Arterial Occlusion (Contribution expérimentale a l'étude des méthodes de traitement chirurgical des oblitérations artérielles). MARCEL VAN DER GHINST. *Acta chir. belg.*, 1953, 52: 271.

The results of direct stimulation of sympathetic fibers, and also of vasodilatation following their section, prove that the sympathetic system has a vasoconstricting effect. The existence of vasodilating fibers and the cholinergic character of their innervation have been described by several investigators.

Two methods are at our disposal to demonstrate the existence of vasodilating fibers. After blocking the vasoconstricting action by suitable drugs, electric stimulation of the vasomotor apparatus at various levels, from the cerebral cortex to postganglionic sympathetic fibers, may be employed. The second method consists of a study of active vasodilator phenomena in an intact dog's paw; their disappearance after sympathectomy proves the existence of vasodilating fibers. The author favors the last mentioned method. He was not able to demonstrate with the first method active vasodilatation in the cutaneous regions of paws.

Two observations support the hypothesis of existence of an active vasodilating mechanism: the appearance of vasomotor oscillations in a paw immersed in ice water, and maintenance of the temperature of the paws at an elevated level after removal of the animal from a hot chamber to one with a low temperature. Sympathectomy markedly diminishes, but does not abolish, the frequency and amplitude of the aforementioned oscillations and renders the affected paw more sensitive to variations of the external temperature.

Although such observations support the theory of existence of cutaneous sympathetic vasodilating fibers, another explanation also should be considered, i.e., absence of certain reactions of vasodilatation in sympathectomized paws may result from abolition of vasoconstricting tonus which may be subject to central inhibition.

Refrigeration of a sympathectomized paw may provoke a remote vasoconstricting reaction.

Direct vasodilating reactions not only persist in a paw after posterior rhizotomy, but may be more frequent and more intense than in an intact paw. Subsequent sympathectomy diminishes the intensity of such reactions.

It is possible to induce a remote vasomotor reaction by refrigeration of a paw after rhizotomy.

JOSEPH K. NARAT, M.D.

The Treatment of Venous Thrombosis with Heparin. CURTIS P. ARTZ and EDWIN J. PULASKI. *Angiology*, 1953, 4: 321.

Despite early ambulation and a decrease to 0.6 per cent in the incidence of deep thrombosis, this complication remains one of the dreaded sequelae of surgical operations. In a large series of patients who had venous thrombosis and who were treated conservatively, 10 per cent expired and pulmonary embolism developed in 28 per cent, whereas, among those who were treated with anticoagulants, 0.5 per cent expired and pulmonary embolism developed in 1.4 per cent.

During the past several years, the pendulum has swung between venous ligation and anticoagulant therapy. As more experience has accumulated, these two methods have been found to be useful as supplements to one another rather than as rival forms of therapy. The use of anticoagulants in the treatment of existing thromboembolic disease is based on their efficacy in preventing or minimizing the occurrence of further thrombus formation. Because of the many disadvantages of dicumarol, heparin is considered a superior anticoagulant. Several types of heparin are commercially available for clinical use: (1) heparin (10 mgm. per c.c.); (2) concentrated aqueous heparin (200 mgm. per c.c.); and (3) heparin in gelatin (200 mgm. per c.c.).

The preferred method of administration of heparin (10 mgm. per c.c.) is by the intermittent intravenous technique (50 mgm. of heparin every 4 hours). Concentrated heparin (200 mgm. per c.c.) is effective when given subcutaneously at 12 hour intervals. It is also effective when given intramuscularly, but injection subcutaneously is the preferred route of administration. This technique of administration is advantageous in that it can be given easily by nursing personnel and does not cause discomfort to the patient. The preferred method of administration of heparin in gelatin is 300 mgm., given initially, and 200 mgm. given daily thereafter in the deep subcutaneous tissues.

Heparin therapy should be continued for several days after the patient is out of bed. It is believed that an increase in the coagulability of the blood occurs for a period of 1 or 2 days after the termination of heparin therapy. Unless heparin is continued and the patient is completely ambulatory, the formation of a new thrombus may occur after the cessation of therapy. STEPHEN A. ZIEMAN, M.D.

The Clinical Manifestations and Therapy of the Paget-Schroetter Syndrome (Klinik und Behandlung des Paget-Schroetterschen Syndroms). A. BALAS, J. STEFANICS, L. RANKY, and P. GÖRGÖ. *Chirurg*, 1953, 6: 241.

The authors briefly review the historical development of the Paget-Schroetter syndrome, i.e., primary obliterative disease of the axillary vein. The age, sex, and side-to-side incidences are given. The symptoms and physical signs are thoroughly described, and the early cases are differentiated from the late cases. The authors point out that axillary palpation is positive in only half the cases. Changes in venous pressure are described, and it is emphasized that the pressure in the extremity may be normal at rest, and grossly elevated after exertion.

The authors' technique of brachial phlebography is described and illustrated, with phlebograms of normal veins, early and late cases, and postoperative cases. The interpretation of these films is discussed, and the authors recommend phlebography for every suspected case of this syndrome. Various theories of the etiology and pathogenesis of the syndrome are presented. Repeated minor trauma, vasospasm, intimal thickening, and finally thrombosis are believed to be the usual course of events. The authors do not believe that thrombosis is primary and they minimize the role of infection as an etiologic factor. In a minority of cases a cervical rib, the scalenus anticus muscle, or costoclavicular compression of the vein was observed.

The authors condemn prolonged conservative treatment. They describe two complete remissions after stellate ganglion blocks. Their other patients obtained temporary relief after blocks, and their veins were explored at the site indicated by the phlebogram. Any structural compression of the vein was removed, and in some cases the veins were freed of perivascular adhesions. In late cases, in which high grade organic stenosis was present, the involved segment was resected. A table summarizing the authors' 13 cases is appended, and their reported results are excellent. They strongly recommend operation in the early phase of the disease, before organic stenosis is present. CONRAD A. KUEHN, M.D.

RETICULO ENDOTHELIAL SYSTEM

Freeze-Dried Aortic Grafts. A Preliminary Report of Experimental Evaluation. JAMES W. PATE and PHILIP N. SAWYER. *Am. J. Surg.*, 1953, 86: 3.

Several methods have been devised to preserve homologous grafts. Each has varying success, but the method herein described allows for rapid processing and indefinite storage in almost any environment. The authors compare the reaction of the fresh aorta and the freeze-dried aorta in the experimental animal. It is thought that fresh homologous tissues do not survive in the host, but rather that they are replaced by autogenous tissue. Freeze-dried tissues are dead; therefore it is conceivable that fresh homotransplants may retard the replacement process because cell death must take place before autosubstitution of tissue begins.

Two groups of dogs were selected: one group received fresh grafts of the aorta, and the other received freeze-dried grafts. The grafts were studied at varying intervals after implantation. The preserved grafts were freeze-dried in liquid nitrogen and placed in ampules which were then evacuated and stored at room temperature. After implantation of the grafts the animals were studied by use of aortograms at 3 month intervals. At the time of re-exploration, various tests were made before removing the graft for definitive study. It was found that the mortality was much less in those animals receiving the freeze-dried grafts. Ninety-six per cent of the freeze-dried grafts were classed as excellent whereas only 55 per cent of the fresh grafts were so classed.

The elasticity in the two types of graft was essentially the same. The implanted grafts are generally weaker at their center than near suture lines. Bioelectric studies confirmed that the grafts were dead. Results were not significantly different in grafts stored for 1 week to 25 weeks. Histologically, the only part of the graft to survive is the elastic element. The remainder is replaced from media, intima, and adventitia of normal vessel plus a small quantity of tissue from the host site. The substitution was most rapid at the suture site, especially in the freeze-dried graft. The rate of re-endothelialization was twice as rapid in freeze-dried grafts. The amount of reaction in the surrounding tissue was distinctly greater to the fresh graft.

Because of more rapid healing at the suture site in freeze-dried grafts, fewer ruptures at this site occur than in the fresh graft preparation. Grafts stored by the freeze-dried method may be somewhat more desirable for tissue replacement than the fresh homograft. RICHARD L. LAWTON, M.D.

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

Protein Metabolism of Surgical Patients. F. E. Revers and C. Eikelenboom. *Arch. chir. Neerl.*, 1953, 5: 81.

The correct interpretation of plasma protein values may be endangered by two factors: (1) in severe dehydration, increasing protein percentage of the plasma results and in this way a low protein percentage may be masked and covered up, and (2) while the protein percentage of the plasma may be normal, the various protein fractions may have abnormal values.

Examination of the protein percentages of a large number of surgical patients has made it clear that in a multitude of cases there is a reduction of the albumin percentage. A decrease in the globulin percentage is comparatively rare.

From a test series, the author was able to show that a low albumin percentage figure may be inferred from a low erythrocyte figure. From Whipple's experiments on the restoration of hemoglobin and plasma it became known that the formation of hemoglobin has priority, the other proteins taking second place.

Some factors that may disturb the protein economy of the body include (1) starvation, (2) liver conditions, (3) loss of proteins through the kidneys and intestines, and because of injuries, (4) hormonal regulation, (5) trauma including surgery, and (6) certain diseases, including carcinoma and serious infection.

The consequences of disturbed protein metabolism include anorexia, disturbed water distribution, injuries to the liver, slow healing of wounds, sensitivity to shock, lowered resistance to infections, and intoxications.

In cases of liver affection there is a fall in the albumin percentage. Attempts to improve the plasma albumin percentage by means of high protein diets failed in these patients. There is strong basis, therefore, for the argument that albumin is made in the liver. Whipple and other workers have shown that protein plays an important part in the defense of the liver against injury by chloroform, arsphenamine, and other toxic drugs.

Hypalbuminemia produces reduction in the osmotic pressure and in turn causes edema. As a further result of increased fluid level of the subcutaneous tissue there is a tendency to develop serious decubitus. Rapid passing and repassing of proteins through capillary walls were demonstrated by Madden and Whipple in their animal experiments.

Apart from the plasma proteins it is important to study nitrogen balance. It has been shown that trauma, fractures of the leg, burns, and surgical procedures, all cause negative nitrogen balance. Four factors are involved: (1) the direct loss of tissue at the site of the trauma, (2) the loss of blood and exudate, (3) excessive protein breakdown, and (4) disuse atrophy. Accordingly, in the case of a burn of full-thickness skin covering 60 per cent of the body area, there may be a total protein loss of 2,200 gm. Following fracture of a leg the total loss of nitrogen may be as much as 137 gm. (corresponding to 856 gm. of protein) or 8 per cent of the total quantity of the body proteins). The total amount of proteins in the human body is approximately 10 kgm.

A record was kept of the nitrogen balances of patients before operation and for some time following it in the surgical clinic. The following information was deduced:

1. Following surgery, nitrogen intake drops below the required minimum. This is true especially when intravenous glucose is given.

2. In spite of insufficient intake, the nitrogen loss remains at the preoperative level for 5 or 6 days.

3. The negative quality of the nitrogen balance is not due to an increased nitrogen loss but to a decreased nitrogen intake.

4. A negative nitrogen balance may be compensated for by adequate nutrition.

5. When certain nitrogen stocks have been consumed the body apparently adapts itself to a more economic use of nitrogenous substances.

6. Complete or partial abstinence from food (without surgical procedures) has the same effect on nitrogen balance as has a surgical procedure. Therefore, it is not the surgery but insufficient nourishment which causes negative nitrogen balance.

In the presence of modern surgical techniques, posttraumatic protein breakdown is not seen. The reasons for this are manifold: the trauma is reduced to a minimum by preoperative treatment, proper surgical technique, modern anesthesia, transfusions before and during the operation, and anti-infectious therapy.

It is imperative that the surgeon pay the greatest attention to adequate diet. Furthermore, it is only when oral administration is impossible that the parenteral route should be used. Blood is not very suitable as a nutrient. The protein present in hemoglobin is not available for protein metabolism until the erythrocytes are broken down and this takes place very slowly. Weech demonstrated that in order to raise the plasma protein level 1 per cent, 1,000 gm. of protein were required, i.e., 28 flasks of plasma, each of ½ liter, or a total of 56 flasks of whole blood. Therefore, so far as it concerns the protein stocks in an exhausted body, a flask of plasma is inadequate. The alternative is ample food via the intestinal tract adjusted to the patient's capacity of assimilation.

An extensive literature concerning amino acid therapy has been written. It has been proved possible to feed patients intravenously with amino acids for a long time in retaining positive nitrogen

balance. In the opinion of the author, fat, glucose, and amino acid mixtures are proper infusions for postoperative use to prevent a negative nitrogen balance. KENNETH E. SHERMAN, M.D.

Cardiac Arrest and Ventricular Fibrillation. B. D. STEWART, ROBERT W. VIRTUE, and HENRY SWAN. *Arch. Surg.*, 1953, 66: 703.

Since there is some disagreement as to the effect of hypoxia and hypercapnia on temporary cardiac arrest resulting from vagal stimulation, an attempt was made to re-evaluate it. It seemed possible, also, that there might be differences in the response to these variations between the chronically hypoxic dog and the normal dog, particularly since much cardiovascular surgery is done on patients who are chronically hypoxic. The effects of these conditions on the cardiac arrhythmias induced by epinephrine in animals under cyclopropane anesthesia were also investigated.

The effect of acute hypoxia and hypercapnia induced by breathing mixtures containing varying amounts of oxygen and carbon dioxide on the cardiac arrest produced by vagal stimulation was studied in normal and chronically hypoxic dogs. In the normal dog, hypercapnia significantly enhances vagal cardiac arrest, but in the chronically hypoxic dog, this does not occur.

Acute hypoxia appears to make cyclopropane-epinephrine arrhythmias more prolonged, whereas hypercapnia apparently has no specific influence.

In one-third of the chronically hypoxic dogs, ventricular fibrillation was induced by vagal stimulation, whereas this arrhythmia did not occur with vagal stimulation in previously nonhypoxic dogs. SAMUEL KAHN, M.D.

Cardiac Arrest in Infants and Children. WILLIAM H. SNYDER, JR., MONICA H. SNYDER, and LAWRENCE CHAFFIN. *Arch. Surg.*, 1953, 66: 714.

Sixty-six cases of cardiac arrest in children, not previously reported, are presented. These have accumulated over a 23 year period. Thirty-one cases occurred during general operations and 35 during cardiac surgery.

There has been an alarming increase in the incidence of cardiac arrest during the past 5 years. This appears to be a problem of anesthesia, which is dependent, perhaps, on the dead space and the respiratory resistance in the mask and tubes leading from the face.

The plan of management of the condition consists of immediate recognition of cessation of the heart beat during surgery, by having previously strapped a stethoscope to the precordium. When arrest is apparent, the heart is exposed through the fourth interspace and massage is started. Oxygen is artificially supplied to the lungs.

Prior to the adoption of the present plan of management, no child survived. Under the present plan, 25 per cent have completely recovered. SAMUEL KAHN, M.D.

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

An Assessment of the Therapy of Burns: A Clinical Study. CARL A. MOYER. *Ann. Surg.*, 1953, 137: 628.

An excellent critical evaluation and objective analysis of burn treatment based on the death rates observed in four institutions in the United States between 1944 and 1951 are presented.

The mortality from thermal injury was the same regardless of the type of therapy employed for injuries covering from 15 to 35 and from 70 to 100 per cent of the body surface. It was noted that the death rate from burns and scalds in these four American institutions was practically identical with that observed by Bull and Squire in Glasgow, Scotland and Birmingham, England, between 1942 and 1948.

The author points out that the treatment of shock is no longer the major problem in treating the severely burned individual. It is hoped that the opportunity of observing the totally burned patient for a number of days, which modern shock therapy has provided us, will give rise to new ideas in the treatment of burns.

Some of the suggestions for improving the death rate from burns and scalds should be investigated. The adoption of more rigid asepsis in the care of the patient and the development of means of more efficient and rapid coverage with autogenous skin graft are suggested possibilities to be explored. JOHN E. KARABIN, M.D.

The Use of Dextran (Macrodex) in Burns. Review of the Physiology of Dextran. EDWARD V. JOHNSTON and JOHN S. LUNDY. *Am. J. Surg.*, 1953, 85: 713.

Dextran is a high molecular polysaccharide composed of glucose units jointed into long chains. By acid hydrolysis, the average molecular weight of raw dextran is now brought to between 30,000 and 150,000, the saline content to 0.9 per cent, and the viscosity and colloid osmotic pressure to that approaching normal human plasma.

On intravenous administration the large molecules of dextran exert an osmotic effect in the blood stream. In cases of secondary shock unaccompanied by blood loss to a marked extent, as in injury to a part of the body, there is an increased local capillary permeability with increased loss of fluid into the interstitial space. There is also a generalized lowering of concentration of the plasma proteins due to loss of large molecules, especially plasma albumin, at the site of injury. In such cases, dextran, if infused, also diffuses out to the interstitial tissue space at the injured site to a certain extent. However, after the initial decrease, sufficient of the larger molecules remain in the blood stream to maintain a higher osmotic pressure effectively, thus minimizing edema formation with its subsequent interference with the gaseous and metabolic exchange and wound repair. After in-

fusion, very large amounts of dextran raise the plasma osmotic pressure above normal for a very short while, the excess disappearing from circulation rapidly.

There is a lowering of plasma protein concentration, especially the albumin fraction, which is due to active supplanting of the proteins by the infused dextran. This is possibly a homeostatic mechanism tending to prevent colloid osmotic hypertension. The osmotic pressure of the blood thus tends to remain constant. The dextran-induced hypoproteinemia does not show any of the usual hypoproteinemic sequelae. The protein level gradually returns to normal following the disappearance of dextran from the circulation.

Following dextran infusion there is a pronounced increase in the blood volume, which is somewhat decreased but still demonstrable after the lapse of a few days. The plasma volume and the cardiac output also are augmented.

Simple hemodilution causes an immediate fall in the values for hemoglobin level, hematocrit, and erythrocyte count. There are no significant alterations in the body electrolytes or in the blood chemistry. There may be an increase in the sedimentation rate and the rate of rouleaux formation. The intravascular agglutination noted after the use of earlier brands of dextran of very high average molecular weight does not occur to any significant extent with the use of the current low molecular weight brand of dextran. With regard to the difficulty in typing the blood following dextran infusion, the literature is contradictory.

Results of metabolism studies with regard to the retention of dextran by body tissues has been negative in the main. The complete details of the breakdown process is not yet known.

Probably more than 50 to 60 per cent of the infused dextran is excreted through the kidneys. About one-third of the dextran present at any time in the body disappears during the next 24 hours, the plasma concentrations being barely detectable after 5 or 6 days. The larger molecules are excreted more slowly. Hemopoietic depression and abnormalities have not been observed. Evidence on antigenicity is confusing although there may be a crossed antigenic response between dextran and certain strains of pneumococci. The overall incidence of reaction following dextran therapy is about 0.2 per cent. No death has yet been recorded as being due to such infusion. The high incidence of reactions following infusion reported previously was probably due to the type of raw dextran used.

In experimental animals, dextran containing vacuoles has been seen in the liver cells after the infusion. However, in human beings who have had such infusions, no alterations have been noted by means of the more sensitive liver function tests. The effect of dextran on the kidneys is more controversial. Temporary and reversible changes have been described, usually in the tubules and less frequently in the glomeruli. However, renal function tests carried out on patients who have received dextran intravenously have not shown any alteration in the functional status of the kidneys.

RANES C. CHAKRAVORTY, M.D.

Use of Dextran (Macrodex) in Burns. Clinical Evaluation in 8 Cases. EDWARD V. JOHNSTON, WARREN A. BENNETT, JOHN S. LUNDY, and JOSEPH M. JANES. *Am. J. Surg.*, 1953, 85: 720.

Eight cases of severe burns in which treatment consisted of, among other measures, the infusion of dextran are reviewed. Five patients died of their injuries and 4 were autopsied.

The amount of macrodex (dextran) infused varied from 7,400 c.c., to 380 c.c. This substance was found to be a satisfactory plasma volume expander in the shock phase. The oral intake of protein supplements is important, especially in protracted dextran therapy.

Following dextran infusion there is a hypoproteinemia due to simple hemodilution and also to active supplanting of the plasma proteins by dextran. However, the hemodilution anemia has not been a problem.

The blood type and Rh determinations have not noticeably been affected by the therapy, although the method of estimation of serum proteins had to be modified somewhat.

Granularity and swelling of convoluted tabular epithelium of the kidneys, with moderate vacuolation and rare sloughing of the epithelium, as well as amorphous eosinophile debris in the tubular lumen, were noticed in all the autopsy specimens. These changes are consistent with the administration of dextran. However, these changes are reversible, as the findings were progressively less the greater the delay between death and the time when the dextran had been administered, irrespective of the quantity of dextran infused. Further investigation of the relationship between dextran-induced tubular changes and those associated with the syndrome of "lower nephron nephrosis" is desirable.

RANES C. CHAKRAVORTY, M.D.

Streptokinase and Streptodornase in the Treatment of Hemothorax and Pyothorax, and Acute and Chronic Suppuration in Other Sites (Streptochinasi e streptodornasi nel trattamento degli emotoraci dei piotoraci e di suppurazioni acute e croniche in altre sedi). GIUSEPPE D'ASTE and GIOBATTA CERRUTI. *Rass. ital. chir. med.*, 1952, 1: 451.

Streptokinase and streptodornase were utilized in the treatment of 6 patients with postoperative hemothorax, 3 patients with pyothorax, 6 patients with tuberculous pleurisy, and 13 patients with acute and chronic extrapulmonary suppuration.

The cases are reported in considerable detail with accompanying roentgenograms and adequate follow-up studies.

The authors have found that in the acute pyothorax recovery has been rapid and complete. With hemothorax, dissolution of the coagulum was

prompt and satisfactory. In 2 of 6 cases of tuberculous empyema the tubercle bacillus could no longer be recovered in 2 cases. However, it was the authors' belief that the decreased viscosity of the empyema facilitated the further therapy.

There were no untoward reactions from the administration of the enzymes and the thermal reactions frequently encountered could be easily controlled. GEORGE L. NARDI, M.D.

ANESTHESIA

Controlled Paralysis of Skeletal Muscle. A. L. WNUCK, STATA NORTON, C. H. ELLIS and E. J. BEER. *Anesthesiology*, 1953, 14: 367.

The use of curare provides profound muscle relaxation with a lighter plane of anesthesia. The curare which will produce intense relaxation and can be controlled over the duration and intensity of action must possess specific properties, i. e., quick onset, short duration without cumulative effects, intense action, and freedom from side effects.

The control over the duration of action is obtained by proper continuous or repeated dosages of the drug. The authors have studied the properties of the relaxant effect of the usual curares (d-tubocurarine, decamethonium) and succinylcholine diiodide on the gastrocnemius-sciatic nerve preparations in cats and dogs.

The usual curares have long duration of action and a cumulative effect when repeated doses are used. Succinylcholine has a quick onset, short duration, and intensity of action, but there is a slight cumulative action when subsequent doses are given at rather short intervals. However, the continuous intravenous infusion of succinylcholine does not produce cumulative action and side effects, and the duration and depth of relaxation can be controlled by regulation of the drip rate.

Therefore, the authors conclude that the administration of continuous intravenous infusion of succinylcholine is a suitable procedure for the production and maintenance of controlled muscular relaxation. IPPU FUKUDA, M.D.

Xylocaine: A Superior Agent for Conduction Anesthesia. JAMES L. SOUTHWORTH and C. HARWELL DABBS. *Current Res. Anesth.*, 1953, 32: 159.

An additional 1,468 cases in which xylocaine was used for conduction anesthesia are described by the authors. Among 68,281 collected cases, the incidence of reaction was low following the use of this drug; therefore, the drug can be considered safe for clinical use. The desirable properties of this drug are such that it closely approaches the ideal local anesthetic agent. It has been used for conduction anesthesia in peripheral nerve block, continuous segmental spinal anesthesia, local anesthesia, caudal anesthesia, single injection spinal anesthesia, sympathetic ganglion block, continuous spinal anesthesia, topical-urethral instillation, and topical pharyngeal spraying without any serious complications. The maximum dosage of this new anesthetic agent has been estimated as not over 500 to 1,000 mgm. The authors have used as much as 900 mgm. of this anesthetic agent without any ill effects.

JOHN E. KARABIN, M.D.

Management of Anesthesia of the Severely Burned Patient. JOHN R. ROOK. *Lancet*, 1953, 164: 1214.

The severely burned patient has to wait 2 to 3 weeks until dead skin and tissues have separated and the burn is ready for skin grafting. During this time the patient's general condition is likely to deteriorate and the patient becomes a progressively poor anesthetic risk.

The correct preoperative management is to estimate the hemoglobin level and to do blood transfusion if necessary. The anesthesia for infants and children is nitrous oxide and oxygen followed by trichlorethylene or ether. Endotracheal intubation in infants and children must be done with special care because of postoperative laryngitis and edema of the glottis. The anesthesia for adults is nitrous oxide and oxygen, combining pethidine, muscle relaxants, and thiopentone. During the operation, adequate blood transfusion is essential to prevent fall of the blood pressure and shock. In children, unexplained collapse might occur. The patient may have great heat loss during the operation and when he wakes up violent shivering or cyanosis may develop. An oxygen tent may aid the postoperative recovery greatly.

The patients with plasma jaundice or infective hepatitis, and aged patients can be operated upon with the anesthesia mentioned, but thiopentone is contraindicated in these cases.

IPPU FUKUDA, M.D.

The Problem of the Anesthetic in the Surgical Therapy of Myasthenia Gravis (Il problema dell'anestesia nella terapia chirurgica della miastenia grave). ANTONIO DAURI. Ann. ital. chir., 1953, 30: 55.

The 54 year old patient had began to suffer 20 years previously from attacks of bronchial asthma (enlarged thymus?) and after the first asthmatic crisis was never entirely free from a sense of asthenia. About 6 months previously the patient began to experience difficulty in raising the eyelids and positive diplopia developed on the left side. Later the right eye became similarly involved and the muscles of the tongue began to weaken and tire easily. Roentgenologic examination disclosed an enlarged thymus with cystic degeneration.

At operation the posterior transthoracic route was selected and a cyst the size of a small melon was removed from the upper mediastinum.

In the management of the anesthesia for this operation the author started with the principle that nothing affording a curarelike effect was to be employed. Before the operation was started the patient was given a dose of 2.5 mgm. of prostigmine and 1 mgm. of atropine. A quarter of an hour later 10 mgm. of

morphine and 1 mgm. of atropine were administered. Premedication consisted of 0.5 gm. of pentothal given intravenously in a 5 per cent solution and the anesthesia was carried on with 30 per cent cyclopropane in a closed system, the periods of maintenance being alternated with periods of a mixture of 5 per cent carbon dioxide in oxygen.

The second operation on this patient consisted of transsternal removal of the rest of the thyroid gland. The usual prostigmine and atropine premedication was carried out and the patient given 100 mgm. of dolantin. Just before operation, another 0.5 mgm. of atropine was given intramuscularly. The anesthesia was conducted with oxygen and nitrous oxide gas (50 per cent). The advantage of laughing gas over cyclopropane as an anesthetic preparation is its lack of explosive quality. Every 30 minutes during the course of the operative procedures 25 mgm. of dolantin were administered intravenously. Novocain in 1 per cent solution with adrenalin (1/500,000) was infiltrated along the line of incision, but none was given intravenously (curarelike effect).

During this operation the left pleural cavity was accidently opened; however, with the aid of the Magill intratracheal tube, the condition was easily controlled and the tear in the pleura repaired. The patient, with the aid of intense prostigminization and atropinization (to control the tendency toward profuse bronchial secretion in this condition immediately after operation and with lesser intensity during the convalescence), recovered without incident from both operations and has experienced considerable amelioration of his condition.

At no time during premedication, or during the operation itself, were any fluids administered because of the tendency of these patients to develop edema of the larynx. During each operation the Magill endotracheal tube was ready for emergencies (pleural tear) and for terminal re-expansion of the lung.

JOHN W. BRENNAN, M.D.

SURGICAL INSTRUMENTS AND APPARATUS

The Conservative Treatment of Hemangiomatous Nevi. H. J. WALLACE. *Brit. J. Plast. Surg.*, 1953, 6: 78.

This article is a study of some 300 patients with various forms of hemangiomas presenting at or soon after birth, and observed at regular intervals for the most part at St. Thomas's Hospital over the past 15 years. Over any 7 year period it has been possible, on an average, to achieve a full follow-up in 95 of 100 patients. This applies to both superficial and deep hemangiomas.

Excluded from this article is consideration of the treatment of arterial hemangiomas, diffuse hemangiomatosis, gigantism, and multiple familial telangiectasia. The remainder may perhaps be classified into two main groups: flat and raised.

1. Flat hemangiomas.

a. Spider nevus (stellate hemangioma) is seldom present at birth, and may often appear for the first time in adult life. It may undergo spontaneous regression in childhood, but seldom in adult life except when associated with liver disease or pregnancy.

b. Salmon patch (erythema nuchae) is pale pink, occurring especially on the nape of the neck and forehead and fading in a few months.

c. Port-wine stain (nevus flammeus) is of a deeper color. There is a thin layer of capillary tissue in the dermis. The lesion is permanent. A rare variant of this is a thicker plum-colored nevus often associated with intracranial lesions, the Sturge-Weber syndrome.

The only treatment seen of any value in port-wine stains is the application of thorium-X. This is a breakdown product of radium and consists almost entirely of alpha particles, alcohol or varnish being used as the vehicle. Almost all the radiation is absorbed within the first third of a millimeter of the skin and hence the theoretical and, as time has shown, the practical risk of radiodermatitis is negligible. This radiation is followed by inflammation and obliteration of the superficial capillaries. The results may be summarized by saying that in no instance has staining completely disappeared, with the exception of 2 rather doubtful instances in which treatment was probably mistakenly given for the pale patches on the forehead and nape of neck of the type presenting at birth and undergoing spontaneous involution, as mentioned previously. In about two-thirds of the patients treated with thorium-X the intensity of the staining has been greatly reduced; in the remaining one-third improvement was trifling.

There has been no constant correlation between the number of paintings and the results obtained; indeed some of the best ultimate results were obtained with a few paintings, and Bowers (1951) considers that some of these good results may be explained by the inadvertent inclusion of very superficial strawberry nevi which regularly undergo spontaneous involution. No evidence of radiodermatitis has been observed in patients treated as long as 13 years ago. Apart from an erythematous reaction soon after treatment, the only complication has been transient pigmentation.

These results, although unsatisfactory, have seemed to be vastly superior to anything that can be offered by freezing, x-rays (which, to be effective, always cause radiodermatitis), or even the results from plastic surgery, especially on the face. Plastic surgery, however, seems to offer the only hope of radical improvement in cases of the deeper plum-colored lesions of the Sturge-Weber syndrome.

2. Raised hemangiomas.

a. Superficial, strawberry.

b. Deep, cavernous.

It is perhaps concerning these types of hemangioma that there is the most controversy about treatment. Clinicians, both physicians and surgeons, have long observed that both of these types of hemangioma presenting at or soon after birth frequently undergo

complete or nearly complete spontaneous involution over a period of a few years. This is a matter of simple observation, and it is exceedingly difficult to reconcile the results of such elementary observation with statements that spontaneous involution is rare. Perhaps the simplest observation in this respect is a comparison of the frequent occurrence of hemangiomas in the first few months of life compared with their rarity in the adult. Lister, Bowers, Walter, and many others have published articles regarding this high incidence of spontaneous involution in both strawberry and cavernous hemangiomas, and figures of over 95 per cent have been quoted. In the series which forms the basis of this article there were 208 patients with strawberry nevi, often multiple, and 98 patients with 121 cavernous nevi of which 78 had some superficial capillary element.

The completeness of involution is clearly important when the results of treatment are assessed, and these results are tabulated.

Most of the involution occurs within the first 2 or 3 years of life but may continue up to the age of 7. Very infrequently, when involution is incomplete by the age of 5, further treatment is advised for psychological reasons, but it is of trifling consequence compared with the treatment required when the hemangiomas are in full bloom. In strawberry hemangiomas the appearance of gray flecks is the earliest sign of spontaneous involution and it may occur very early. Ulceration has occurred in a few patients but has not caused any serious trouble; indeed, it has not been comparable to the ulceration following many forms of treatment. The danger of strawberry or cavernous hemangioma enlargement to such a degree that vital structures are injured has, in the author's experience, been greatly exaggerated. Certainly the term "invasive" is one that should be used with great caution.

Most of the recorded reports of malignant change in these hemangiomas bear the imprint of panic combined with inadequate knowledge of their natural history. There is, however, a very rare type of strawberry hemangioma which does not alter in size out of proportion to the patient either during infancy or childhood, but in which malignant change has been recorded at or after puberty but never before. The general impression of these lesions is that they are redder than the usual and at no time show any signs of involution. It is thus fairly easy to recognize such very rare lesions by the age of 6 or 7, and excision seems to be indicated. It is still uncertain whether this becomes a true sarcoma or may be part of a generalized malignant reticulosis. From observations on this series of patients, resolution appeared to occur less frequently and to be less complete when the hemangioma involved a mucous surface, such as the lip. The presence of veins arranged in a stellate formation around the nevus also seemed to be associated with a worse prognosis. With regard to the lesions which did not undergo any involution, 3 observations were made which may be relevant. The first was that in 3 of these patients there was a family history of similar lesions which had not undergone spontaneous involution. The persistent strawberry hemangiomas were rather redder than usual. Perhaps most important was that all these lesions were present at birth and grew only in proportion to the growth of the child. This confirms similar reports on these lesions which occasionally undergo malignant change, as already mentioned.

It is not the author's purpose to suggest that all strawberry and cavernous hemangiomas should be left untreated, but rather that more attention should be given to the natural history of this disorder before treatment is given. Many of the treatments are painful and require repeated anesthesia. X-rays and radium, beyond the limits of small doses, carry the risk of radiodermatitis, epiphyseal damage, and other malformations. A joint study of the results of various forms of treatment might enable us to get a more accurate assessment than has been available hitherto.

JOHN E. KIRKPATRICK, M.D.

Plantar Keratodermia Treated by Split-Skin Grafts. D. WYNN-WILLIAMS. *Brit. J. Plast. Surg.*, 1953, 6: 123.

The author's case is reported in view of the distressing nature of plantar keratodermia and the benefit that can be derived from surgical intervention.

Mitchell-Heggs (1950) gives a full description of palmar and plantar keratodermia (tylosis) in the chapter devoted to congenital anomalies chiefly affecting the epidermis, but no mention is made of surgery as a method of treatment.

This case report is of interest in view of the failure of all methods of medical treatment. Congenital ichthyosis, which is a closely allied condition, is reported by Mason (1952) to have been beneficially affected by hypnosis, but this method of treatment could not be undertaken on account of the age of this child.

The value of surgical intervention in keratodermia is difficult to assess, but in this instance split-skin grafting as a primary measure enabled this child to begin walking and ended the sequence of painful dressings.

The decision to employ free grafts to cover areas subjected to pressure was made with the full realization of their unstable nature. The procedure was justifiable since the alternative measures of tubed pedicles or cross-leg flaps would subject the child to greater discomfort and a greater number of operative procedures.

The low normal value of blood serum vitamin A confirms the findings of Porter (1951) in 6 patients suffering from palmar and plantar keratosis. Gutz (1951) found that following vitamin A therapy improvement occurred in 1 of 2 cases. The conclusion, however, is that the oral vitamin A therapy did not improve the condition in the patient described as

there was a deterioration in growth of the hair of the head. The improvement shown in the nails of the hands and feet was probably due to the attention given by the nursing staff while the child was in the hospital.

The appearance and texture of the grafted skin on the heel of the left foot was satisfactory after the stress of weight-bearing for 6 months. Although the use of a split-skin graft was designed as a provisional measure, it appears possible that it may be permanent. JOHN KIRKPATRICK, M.D.

The Treatment of Hemangiomas. D. N. MATTHEWS. *Brit. J. Plast. Surg.*, 1953, 6: 83.

The clinician is faced with a twofold problem in the treatment of hemangiomas. He has to decide which lesions to treat as well as to select the most appropriate method for each particular case. The former decision presents more difficulties than the latter and provokes more argument. Since it is generally agreed that birthmarks are more common in children than in adults, it necessarily follows that some regress spontaneously and ultimately disappear without treatment. In consequence some clinicians believe that none should be treated in childhood, even if they are growing, in the hope that regression will occur later. This policy is open to several criticisms. A certain number of tragedies will occur from rapid extension of the lesion which may become inoperable, ulcerate, or even kill the child. Mental suffering by the child and its parents is unnecessarily allowed to continue; it is often acute in facial lesions, particularly to a child during school days. The observation that ill-judged interference can leave a worse blemish than the original lesion does not justify a policy of laissez-faire provided better judged interference can effect an improvement. A more scientific approach to this obviously difficult problem is to try to determine which clinical types have a high incidence of spontaneous regression and which persist and grow.

Histologically, the lesion consists of a solid mass of fusiform endothelial cells interspaced by strands of connective tissue. As canalization occurs, recognizable arteries, veins, and capillaries appear. While one of these predominates, all three persist in every lesion and are readily identifiable.

In a capillary lesion the blood flow is slow and the blood pressure is low. Hemorrhage, therefore, is slight, much less than from a wound in normal skin. But cavernous and arterial lesions can bleed fiercely. Cavernous lesions always have very large communications with the underlying systemic veins, and hemorrhage, although readily controlled by digital pressure, can be torrential. The pressure in arterial lesions approaches or equals the systolic blood pressure, and bleeding can be both formidable and difficult to control.

A birthmark which increases in size out of proportion to the increase in size of a growing child does so by the invasion of tissue hitherto normal by new cells budded off from the vasoformative mass. Increase in size by elevation from the surface with alteration in appearance may be due to canalization and vascularization of pre-existing vasoformative tissue, but even in such circumstances peripheral new growth usually occurs at the same time. Growth may cease later and on occasion regression may follow, but it is impossible to forecast this. Evidence of active extension of the lesion, whether it is accompanied by alteration of form or not, is a definitive indication for intervention. Delay, in the hope for regression, may allow a lesion to become difficult or even impossible to treat without serious hazard or the risk of damage to secondarily invaded structures. This is true particularly of facial and cervical lesions, the growth of which can be unbelievably rapid in infancy.

The application of heat to the surface of a birthmark coagulates the blood in it; it also produces some degree of scarring in the epidermis and fibrosis in the dermis. Its limitation is the secondary disfigurement which such scarring creates. The method can, therefore, be safely used for only very superficial lesions; moreover, it must be applied with great care. Minimum scarring occurs if the heat is applied with individual needle points set close together leaving minute pieces of intervening skin undamaged. Diathermy is much more satisfactory than cauterization for superficial coagulation, as each coagulated area is smaller and can be set closer to its neighbors without damaging the intervening skin than when the latter is done; also, the depth of coagulation is even and much more accurately controlled, and there is no risk of accident such as may occur if a hot cautery falls from its holder.

The use of gamma radiation either as radium, radon, or x-rays is never justified, in the author's opinion, in the treatment of these benign lesions in childhood. Even in expert hands failure sometimes occurs in the subsequent growth of the surrounding cells with disastrous results. Beta radiation is quite safe but, like carbon dioxide snow, its power of penetration is limited to about 2 mm. For small superficial lesions, however, a beta-radium plaque can give unsurpassable results with no secondary deformity of any sort, but it is unsuitable for the treatment of large lesions, and it is hoped that the application of thorium-X paint will prove a satisfactory substitute. However, it seems difficult to distribute the radioactive material evenly over the lesion with it and the results tend to be blotchy; none the less, good results can be obtained, and the simplicity of the procedure recommends it strongly in the treatment of children. The paint is applied with a brush and washed off after 20 minutes. Several applications may be needed.

The interstitial fibrosis produced by this method commends it for the treatment of bulky lesions extending some distance from the surface. It is particularly suitable for squash cavernous lesions which often shrink dramatically. Moreover, the subcutaneous fibrosis which they induce also frequently fades the capillary hood by which they are often covered.

Saturated saline solution, first recommended to the author by Denis Browne in 1949, is highly satisfactory in all subcutaneous lesions, but it must never be injected into the skin as it invariably causes a slough. When intradermal sclerosis is required, minute quantities of ethamolin should be injected. The ethamolin is first shaken up in a syringe with air to make a froth and small intradermal wheals are raised similar to those produced with local anesthesia prior to the insertion of a transfusion needle. The wheals can then be spread by massaging them with the finger.

When excision is necessary, careful assessment of the likely difficulties and the most appropriate method of repair must be made beforehand. Young infants withstand loss of blood and a long operation very badly, and the stimulus of cutting a graft at the end of such a procedure may tip the scale against them. The graft should be cut a week before the excision is undertaken and stored by refrigeration. The nerve detector, described by Bodenham in 1948, is invaluable in hastening the removal of the common faciocervical lesion without risk to the facial nerve.

The repair will obviously be governed by accepted plastic surgical principles, but whenever possible, free grafts rather than skin flaps should be used on the face in order to preserve as faithfully as possible the normal play of expression.

Sclerosis as a preliminary to surgery has two principal uses. It may either be used in an attempt to hold in check a vast growing lesion in a very young infant until it is old enough for surgery, or it may be used as the definitive method, with surgery following to remove the residual and resultant fibrous thickening.

The selection of an appropriate method of treatment may reasonably be attempted by reviewing in turn the common clinical types of birthmark. However, there is obviously room for individual preference, and in many cases equally good results can be obtained in several ways. The clinician's particular experience with his own methods contributes materially to the quality of his results, and it is impossible to state didactically that one method is right and another wrong.

A classification, already published elsewhere (Matthews, 1951), includes the common types of birthmarks observed in practice.

One of these lesions, diffuse hemangiomatous giantism, is a condition in which a whole limb is riddled with capillary hemangiomatous tissue. In effect, this produces millions of small arteriovenous shunts, as can be proved by measuring the oxygen tension in the returning venous blood. The excessive oxygenation causes overgrowth of all the structures of the limb, which quickly becomes longer and stouter than its fellow. After only a few years the shunts cause pressure on the right side of the heart, which fails and kills the child. Early high ligature of the main artery supplying the limb is the only way to save the child's life. Procrastination until the heart is dilated is fatal. Even amputation does not save such cases at this late stage.

JOHN E. KIRKPATRICK, M.D.

Surgical Support in Permanent Facial Paralysis. C. R. MCLAUGHLIN. *Plastic & Reconstr. Surg.*, 1953, 11: 302.

The author discusses the surgical treatment of patients suffering from irreversible lesions of the seventh cranial nerve; he deals only with patients who for various reasons are unsuited to nerve surgery, but for whom intrinsic support is indicated.

The author's experience was gained in treating 55 patients. He describes three original technical procedures: static support with fascia lata slings to the malar bone, total temporalis transplantation for reanimation, and a new type of lateral tarsorrhaphy for the relief of paralytic epiphora.

Patients are carefully selected. Reconstitution of the facial nerve is the best treatment when possible. Only patients in whom nerve repair is likely to be hopeless are suited to plastic surgery. A careful analysis of the defect leads to the choice of procedure and the material to be used. Silk, wire, and wire gauze have not proved satisfactory. Fascia lata or muscle is satisfactory. A decision must be made between static support which is technically simpler, and dynamic support with its much more satisfactory result.

For static support, the author describes his procedure of looping fascia lata, attached in the usual manner, about the mouth, through a perforation in the malar bone.

Several methods of dynamic support and their shortcomings are mentioned. The author's method of choice and original procedure is to use the temporalis muscle in its entirety, firmly secured to a strip of fascia lata and attached to the mouth as usual. This is described in detail.

Eyelid surgery is necessary, for function and appearance. The author accomplishes this by an overlapping lateral tarsorrhaphy accompanied by an enlargement of the lacrimal opening. Occasionally a medial canthoplasty is needed as well.

The pictured results of the procedures described indicate that these methods have been successful in producing excellent results.

E. HORACE KLABUNDE, M.D.

Use of Intra-Aortic and Intracardiac Transfusions in Cardiac Arrest. HUGH E. STEPHENSON, JR., and J. WILLIAM HINTON. *J. Am. M. Ass.*, 1953, 152: 500.

The advantages of intra-arterial transfusion in cases of profound shock due to acute blood loss requiring ultrarapid transfusion has already been established. However, in case of such a crisis during abdominal or chest surgery, the authors recommend transfusion into the already exposed aorta. Besides availability, the other advantages are: the amount of blood circulating through the vital organs can be increased by pressing on the aorta distal to the

transfusion needle, the response is extremely prompt, early recognition of adequate response, less chance of overtransfusion, and simple pressure of the needle point usually seals the opening and distal ligature is unnecessary; therefore, distal gangrene is unknown. However, misplacement of the needle may cause a retroperitoneal hematoma. A suture may be needed to close the hole in the aortic wall which is left by a large needle. Finally, an arteriosclerotic aorta may be seriously injured by a carelessly managed needle.

Intracardiac transfusion has been reported a few times and the authors give reports of 2 personal cases. However, the indications for using this route are still *sub judice* pending wider experience.

The authors have analyzed the reports of 1,200 cases of cardiac arrest, obtained by personal communication. Nineteen of the patients received intra-arterial transfusion during the period of arrest, resuscitation being achieved in 11 and permanent recovery in only 4. Of the first 1,000 patients 48 per cent were resuscitated, 25 per cent surviving ultimately. The time factor is extremely important, for in 91 per cent of the surviving patients, massage was begun within 4 minutes, while only in the remaining 9 per cent was the time interval between arrest and the starting of massage longer than 4 minutes. In 8 of the 19 patients receiving intra-arterial transfusion massage was instituted before 4 minutes, and of these, 75 per cent were successfully resuscitated. RANES C. CHAKRAVORTY, M.D.

The Bi-Lobed Flap. ALEXANDER ZIMANY. *Plastic & Reconstr. Surg.*, 1953, 2: 454.

The surgeon faced with a surface defect is often able to cover it by means of a sliding or rotating flap. The secondary defect left by the flap can usually be closed by conventional methods. In situations where closure of the secondary defect is difficult or impossible, the bi-lobed flap described by the author is useful. A second smaller flap is raised, usually at a right angle to the first, and rotated into the secondary defect. The final and smallest defect can usually be closed by utilizing laxity of the tissues along an entirely different axis.

The bi-lobed flap allows the surgeon to use a large flap to cover the primary denuded area since this method makes available an amount of tissue that is the sum of the tissues available along another axis at right angles to the first. When the final defect cannot be completely closed it can often be placed in a location where a skin graft would not be cosmetically impossible.

A number of useful applications of the principle of the bi-lobed flap are demonstrated. It has been successfully employed in immediate reconstruction of defects of the upper and lower lips, the cheek, and the ala of the nose. The technique of closure of the defect following excision of an intractable plantar wart is also described.

ROBERT A. WISE, M.D.

The Use of Preserved Bovine Cartilage in Plastic Surgery. JOHN F. NORTH. *Plastic & Reconstr. Surg.*, 1953, 11: 261.

The variety of materials and methods used for the plastic restoration of contour indicate that it is impossible to choose any one substance as the material of choice. Ideal grafting material should (1) be easily obtainable without considerable and painful operation on a donor area, (2) be well tolerated by the recipient area, (3) show no tendency to perforate skin or mucous membrane when close to them or subject them to minor traumatism; (4) have no tendency toward distortion, and (5) have no marked tendency toward late absorption. All of the materials used fail in one or more of these objectives.

Preserved homografts of cartilage best meet the objectives. Preserved heterogenous cartilage (bovine) fulfills the objectives ideally except for its tendency toward late absorption. Reports to date concerning its use vary quite widely in regard to absorption.

A comprehensive analysis of 205 solid grafts performed on 174 patients is presented. Minced or diced grafts were not included as they had previously been proved unsatisfactory.

Clinical and histological evidence is presented that, although the early results may appear promising, the chances of later disappointment for both patient and surgeon are such that the use of bovine cartilage as a routine material for the restoration of contour should be discontinued.

E. HORACE KLABUNDE, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Diagnostic Radiological Aspects of Hypopharyngeal Cancer. SÖLVE WELIN. *Brit. J. Radiol.*, 1953, 26: 218.

In Sweden the hypopharynx is a relatively common site for cancer. Since the Karohuska Hospital in Stockholm was opened in February, 1940 there have been no less than 510 cases of cancer of the hypopharynx observed at this institution. Of these, 206 were in men and 304 in women. Differentiation was made between carcinoma of the upper and lower ends of the hypopharynx, the borderline between these two groups being formed by the superior border of the cricoid cartilage. In men, the malignancy was most often localized in the upper portion, while just the opposite was true in women. Statistically, the difference is significant and is probably connected with the relatively high incidence of the Plummer-Vinson syndrome in women, which is considered a precancerous disease.

In hypopharyngeal cancer the x-ray examination has different purposes which are dependent upon the localization of the tumor. If the tumor is situated in the upper portion, i.e., about the cricoid cartilage, it is easily visualized by indirect laryngoscopy. In these cases the chief purpose of x-ray examination is to supplement the laryngoscopic examination by furnishing information as to the lower limit and the depth of the tumor already diagnosed. If, however, a tumor is localized in the postcricoid portion of the hypopharynx, radiology takes first place above endoscopy and becomes the paramount diagnostic method, just as radiology takes first place in the diagnosis of cancer of the stomach.

The radiological technique used consists of (1) the usual soft tissue roentgenographs and (2) spot films after the swallowing of an opaque medium, to show the mucosal pattern in posteroanterior and lateral views. Analysis of the films is made easier by using planes previously determined and which are marked on both views. The planes chosen have been at the level of the vallecula, the ventricle of Morgagni, and the esophageal opening. A mixture of barium sulfate, 5 parts to 1 part of water, is used. The relief pictures are carefully analyzed and even the slightest deviation from the normal is considered and evaluated.

It was stressed previously that the high incidence of sideropenic anemia in Sweden necessitated a special routine. The author therefore takes films in the phase of maximum filling of the hypopharynx with the slightest sign of dysphagia. This is the only method enabling one to see the typical valvular webs of the Plummer-Vinson syndrome.

Patients with a diagnosis of Plummer-Vinson syndrome are asked to return every 6 months for follow-up examinations. Ten cases of the Plummer-Vinson syndrome have been followed up and in every case the tumor occurred above or below the valvular stricture. When a diagnosis of carcinoma of the hypopharynx is made radiologically the extent of the tumor and the degree of its invasion into the normal surrounding tissues are indicated to the clinicians. Two to 4 weeks after x-ray treatment has been started, a reaction starts. It consists of a decrease in the prevertebral soft tissue shadow, and the mucous membrane becomes smoother, at first due to edematous swelling and later to atrophy of this membrane. The lumen appears to be rigid and deficient in elasticity during the act of swallowing first due to edematous swelling and later to atrophy.

A second later change has been noted which could easily be mistaken for a local recurrence. In many cases it has been noticed that the prevertebral soft tissue shadow increases in width and the outline of the mucous membrane becomes ragged. This second reaction has occurred as early as 3 months and as late as 11 months after x-ray treatment. It is important to bear the late reaction in mind and in cases of suspected recurrence a direct hypopharyngoscopic biopsy is taken.

X-ray examination of the hypopharynx has widened the diagnostic field, and attention has been drawn to the importance of follow-up examination in cases of the Plummer-Vinson syndrome and of fresh biopsy in suspected late recurrence which may only be a "secondary reaction."

FRANK L. HUSSEY, M.D.

The Value of Tomography in Examination of the Intrapulmonary Bronchi. HERMAN LODIN. *Acta radiol.*, Stockh., 1953, Supp. 101.

Since the introduction of tomography in the diagnosis of pulmonary diseases, many reports dealing especially with the value of the method in cavities, tumors, and cysts have appeared in the literature. Tomography has been used also in the study of the bronchi lying within the hilar region (extra pulmonary bronchi). The author investigated the usefulness of tomography for the examination of the intrapulmonary bronchi and, in the present monograph, reports the results of his study.

The monograph is divided into two parts. The first part contains a description of the apparatus and a detailed account of the preliminary experiments which were performed on plexiglass models of the bronchi. The tomograph used was the Danatome. This proved satisfactory, except that the focus-plane distance was too short (86.5 cm.) and the exposure time was too long (0.5 sec.). The plexiglass models were constructed by reproducing as much as possible various conditions encountered within the bronchi during the disease processes and they were tomographed to assess the different factors responsible for a change in appearance.

In the second part the practical conclusions drawn from the model experiments are made the basis for clinical considerations. These include interpretations of tomograms of normal intrapulmonary bronchi, of thickenings of the bronchial wall without obvious change in the lumen, of the various forms of bronchiectasis, and of bronchostenosis.

In summarizing his observations, the author expresses the opinion that tomography should be used as a complement to bronchography and that neither method can replace the other. Tomography is of greater aid in visualizing thickenings of the bronchial wall and the plugged bronchiectatic dilatations surrounded by air-containing lung parenchyma, whereas bronchography is definitely superior in demonstrating bronchial stenosis and the other forms of bronchiectasis.

The monograph contains numerous diagrams, geometric figures, and reproductions of illustrative experimental and clinical tomograms.

T. LEUCUTIA, M.D.

Further Studies on the Early Diagnosis of Cancer of the Stomach (Ancora sulla diagnosi precoce del cancro dello stomaco). GIOVANNI SANQUIRICO and NICOLO' MINUTO. *Radiol. med.*, Milano, 1953, 39: 590.

The authors support the view of Gutmann that gastric carcinoma frequently has a very slow evolution over a period of many years before breaking forth into rapid clinical manifestations. They believe that careful roentgenologic studies during this period of slow development will frequently permit an early diagnosis of carcinoma at a stage which will permit cure by gastric resection.

They illustrate their article with numerous cases in which repeated roentgen examinations of the stomach and duodenum allowed an early diagnosis of carcinoma of the stomach to be made. At operation the surgeon was unable to find the lesion, but nevertheless carried out a gastric resection. In every case the lesion was confirmed by the pathologist.

GEORGE I. NARDI, M.D.

The Roentgen Diagnosis of Bleeding Lesions of the Small Intestine. ANDREW P. DEDICK and LOIS COWAN COLLINS. *Am. J. Roentg.*, 1953, 69: 926.

The authors analyze 72 proved cases of small bowel lesions located in the jejunum and ileum, not including the ileocecal valve. Fifty-three of the lesions were neoplastic and 19 were inflammatory. Malignant neoplasms were the most common. Adenocarcinoma, carcinoma, and lymphosarcoma made up the majority of this group. Leiomyoma, lipoma, and fibroma were the usual benign tumors. Regional enteritis and tuberculosis formed the bulk of the inflammatory processes. Fifty-one cases had adequate study for the purposes of the authors. Bleeding was present in all except 4 patients. These had anemia without melena. Anemia was the chief symptom in the neoplastic group. The benign lesions all exhibited gross bleeding. Either gross or occult bleeding was present with the malignant growths. Pain and diarrhea also occurred, but were more prominent in the inflammatory diseases.

The lesion was demonstrated in 43 of the 51 instances. Routine small bowel study was adequate in most cases. Occasionally, a small intestinal enema or local examination after the injection of barium through a Miller-Abbott tube when the tip was at the site of obstruction or bleeding, as indicated by the aspiration of guiac-positive secretions, was necessary.

The main cause of failure was the disregard of slight alterations in the pattern and the uneven distribution of barium due to flocculation or abnormal motor function.

W. W. NAGLE, M.D.

Duodenal Stenosis Resulting from Arterial Compression (Sulle stenosi duodenali da compasso arterioso). FRANCO FUGAZZOLA. *Radiol. med.*, Milano, 1953, 39: 451.

In stenosis, just as in other diseases of the digestive tube, the clinical symptomatology is frequently so obscure that it does not permit a precise diagnosis without the aid of roentgenology. This aid is necessary not only for determining the position of the functional or organic stenosis but for determining its presence. This is true particularly for the lesser grades of narrowing, frequently with minimal or with complicated and varied manifestations. A very common disease picture of duodenal stenosis (of which the most common exponent is the so-called arteriomesenteric occlusion near the duodenojejunal junction, or third portion of the duodenum) is the so-called gastralgic syndrome with headaches, stomach pains, and nausea, passing on to vomiting and emaciation and frequently suggesting the picture of pyloric stenosis. Another form is the enterocolitic type with colicky pains and alternating periods of diarrhea and constipation. A third picture is the nervous syndrome with convulsions and syncope.

Once the presence of the stenosis has been demonstrated roentgenographically, it is necessary to attempt to determine the nature of the obstruction by diligent study of the findings. Characteristic roentgenologic findings in these cases of chronic arteriomesenteric duodenal stenosis are the atonic stomach with its deposition of shadow-casting material along the floor of the gastric antrum, the normal or dilated duodenal cap and the normal or gaping pylorus, the atonically dilated duodenum, proximal to the stenosis (the author considers this manifestation of dilation one of atonicity rather than of distention because of the presence of a normal or exaggerated duodenal mucosal pattern), which seems to explain the frequent manifestations in these patients from the side of the pancreas and the biliary system, and, finally, the failure of the disturbance in the mucosal pattern to pass through the point of narrowing which, together with the absence of any appearance of angulation at the point of stenosis, tends to exclude most other types of duodenal stenosis (tumor, ptosis, congenital malformations).

In conclusion, the author emphasizes the difficulty of making a precise diagnosis in this more or less neurodystonic form of duodenal stenosis. He regards the aforedescribed atonic dilation in its milder types of manifestation as evidence of a neuromuscular dystonia, a manifestation-picture which is often mistaken for chronic gastritis. Thus, the importance of a precise diagnosis is evident. He believes that effective therapy of the motor insufficiency must be aimed at the neuromuscular dystonia.

A series of 22 reproductions of roentgenograms in the original text illustrate the points raised in the discussion. JOHN W. BRENNAN, M.D.

Differential Diagnosis of Chronic Perforating Carcinoma of the Colon. CLYDE A. STEVENSON and ARNO W. SOMMER. *Radiology*, 1953, 60: 485.

In 10 per cent of 560 consecutive cases of carcinoma of the colon seen at the Scott and White Clinic, Temple, Texas, chronic perforation was found to be present, while an additional 6 per cent revealed probable perforation. The roentgen findings of chronic perforation were unequivocal in 20 per cent, showing evidence of a fistula extending from the carcinoma to some adjacent organ. In the cases without fistula formation, the roentgen diagnosis of perforation was correct in 78 per cent.

In a study of the gross pathologic material an attempt was made to reconstruct the specimen about the opaque barium shadow on the original roentgenograms, in order to determine the cause of the changes which permit a diagnosis of chronic perforation. The specimens showed that in nonperforated carcinoma most of the lesions were annular and constricting, with sudden change back to normal. There was no mass extrinsic to the serosal surface. In cases of chronic perforating carcinoma in which adequate gross specimens were available for study, there was an extrinsic mass in all instances ranging from 1 or 2 cm. in diameter to the size of a large grapefruit. The development of this mass was of interest and explains the roentgenologic recognition or failure of recognition of chronic perforation.

Thirteen of the 61 proved cases showed direct extension into the mesentery without any tendency of the mass to override the normal colon proximal or distal to the lesion. This mass was usually small; if it was large, the cecum was the site of perforation. This accounts for the 22 per cent error in diagnosis, in that the roentgen findings did not differ from those in cases without perforation.

When ulceration of the carcinoma was a prominent feature, roentgenologic recognition of perforation was made easy if the ulceration permitted barium to extend beyond the normal limits of the bowel wall. In cases showing pronounced ulceration, the extension entered the mesentery or formed a fistula leading to a neighboring organ, such as the small bowel, stomach, or bladder.

Seventy-eight per cent of the 61 specimens showed an extrinsic mass which not only extended directly out from the primary lesion but also extended proximally or distally (although rarely in both directions) to compress the normal colon above or below. In the average nonperforated carcinoma, the annular carcinoma presents a sudden change from the colon to a narrow irregular channel with destruction of the mucosa in the channel area. In chronic perforation at either the proximal or distal end of the channel, the colon is compressed by the extrinsic mass so that the return to normal colon is gradual rather than abrupt. In the instance of a polypoid carcinoma with alteration of the bowel wall only at the base of the lesion, consistently reliable roentgen findings could not be obtained.

It is obvious that signs of perforation are associated only with late lesions and suggest a poor prognosis. FRANK L. HUSSEY, M.D.

Visualization of the Common Duct During Cholecystography; Its Significance. MAURICE D. SACHS. *Am. J. Roentg.*, 1953, 69: 745.

With the introduction of cholecystography by Graham and Cole in 1924, another door was opened in the physician's diagnostic armamentarium. Several excellent reports appeared soon thereafter in the literature concerning the physiological aspects of cholecystography. There is a significant number of gallbladder examinations reporting "normal functioning gallbladder" despite the symptomatology referable to the biliary system. Many patients given such reports are eventually subjected to cholecystectomy with removal of a normal gallbladder and no permanent relief of symptoms.

Undoubtedly, the 20 to 25 per cent poor results following surgery on these patients contribute to many of the failures of gallbladder surgery. It is difficult to evaluate evacuation time of the gallbladder as an indicator of motor function of the biliary tract. The roentgen examination of the gallbladder has not changed since it was first described by Graham and Cole in 1924. The standard procedure has been the oral administration of a halogenated preparation (in most instances priodax) 12 hours prior to x-ray examination. Priodax is a sympathicomimetic drug which retards emptying of the gallbladder.

Although the previous reports on visualization of the common duct and gallbladder evacuation were of value, it was believed that the common duct probably could be visualized more often if, in addition to serial films at short intervals, a drug with the property of constricting the sphincter of Oddi were given just prior to the fatty meal. A series of 84 patients to whom 1/6 grain of morphine was given prior to the fatty meal was studied. In no instance was either the cystic or common duct visualized. The density of the gallbladder was increased. The effect of morphine was not only to cause spasm of the sphincter of Oddi but also to occlude the neck of the gallbladder at Luetkin's sphincter.

A number of vagoconstrictor drugs were then considered. Prostigmin was selected from the list. In this study for the convenience of the radiologist

and technician, automatic 8, 15, and 25 minute films were taken. These films provided an excellent study of the rate of evacuation, as well as a demonstration of the extrahepatic ducts. The pertinent roentgenoscopic findings were observed during the initial 30 minutes following the fat meal. Contractions began within 8 minutes. The gallbladder contracted as a whole or in segments largely confined to the upper half. Multiple contractions made the gallbladder appear lobulated with the lobules arranged in a row, like a string of pearls. In some instances, the contractions were so complete that the upper half was contracted to the diameter of the cystic duct and appeared to be continuous with it. True peristalsis was not observed. A gradual diminution in the size of the gallbladder was observed within the first 25 minutes. In most instances, the gallbladder was reduced approximately 25 to 50 per cent. If a 45 minute and 1 hour exposure was made, the reduction in size varied from 50 to 65 per cent. At 3 to 6 hours, the gallbladder was about 85 per cent its original size. Heister's valves of the proximal half of the cystic duct resembled a corkscrew or a section of a string of pearls. The distal half of the cystic duct was smooth and it was often difficult to differentiate it from the common duct. The lumen of the cystic and common duct appeared equal in thickness and approximated the diameter of the lead of a lead pencil. Anatomically, the lumen of the common duct measures 7.5 mm. in diameter. However, roentgenographically, the smaller diameter of the column of contrast medium was due to the gallbladder contraction with the spurting of the medium in a streamlike fashion through the duct. During the evacuation phase, the gallbladder sometimes obscured the cystic duct, which might be coiled and looped over on itself. No peristalsis has been observed in the extrabiliary tract. Sometimes, the common duct appears wavy, suggestive of peristalsis, but this is probably due to an elastic recoil mechanism.

Cholecystography should consist of multiple films taken at approximately 8 minute intervals during the first 30 minutes following the fatty meal. In conjunction with this technique, prostigmin, by its action on the sphincter of Oddi, aids in the visualization of the common duct.

FRANK L. HUSSEY, M.D.

Principles of Vertebral Tomography. INGEMAR BOKSTRÖM. *Acta radiol.*, Stockh., 1953, Supp. 103.

With the aim of determining the precise indications for tomography as compared to conventional roentgenography for the examination of the vertebral column, the author performed numerous experimental studies by using unmacerated vertebrae obtained from fresh autopsy cases and producing artificially various lesions which might be encountered in clinical work.

A detailed description of these studies is embodied in the present monograph which also includes a brief historical review of the development of tomography as well as a discussion of the principles of the various apparatuses used for this procedure. The author employed throughout the apparatus called "danatome," which is a unidirectional tomograph with 35 and 17 degree amplitudes and which permits examination with the patient prone or supine and in several intervening positions on a horizontal table.

The experiments were divided into two main groups. Group I included study of the roentgenographic and tomographic appearances of the shape and surfaces of the normal vertebral bodies and of experimentally produced superficial defects and fractures, similar changes observed clinically in various disease processes being used for reference. Group II comprised investigations on the visualization by both methods of the normal substantia spongiosa and especially on the accuracy of determining the size, shape, and content of artificially produced defects and of areas of increased density within this substance. Most of the exposures were made with the specimens immersed in water at various depths to secure conditions resembling those existing in clinical examination.

The general conclusion was reached by the author that tomography as a complement to conventional roentgenography is useful for examination of the vertebral column in small lesions of the upper and lower surfaces of the vertebral body and in the relatively large destructive lesions of the substantia spongiosa. It is also of value when superimposed structures, such as skeletal parts, pulmonary structures, and intestinal gas must be ruled out and when conventional roentgenography fails to show the vertebral details adequately, as, for example, in the anteroposterior view of the upper cervical spine and in the lateral view of the lower cervical and upper dorsal spine.

The monograph is profusely illustrated with reproductions of roentgenograms and tomograms amplifying the significance of the points discussed.

T. LEUCUTIA, M.D.

Microangiography. SVEN BELLMAN. *Acta radiol.*, Stockh., 1953, Supp. 102.

The roentgen visualization of the minute blood vessels (arterioles, capillaries, and venules) has formed more recently the favorite topic of several investigators. The results published, especially by Barclay and his coworkers, have suggested that the method might find applicability in a wide range of surgical problems.

The author of this excellent monograph, stimulated by these newer contributions, has undertaken a series of studies at the Department for Physical Cell Research of the Karolinska Institutet and the Department of Surgery of the Serafimerlasarettet of Stockholm, Sweden. His primary purpose was to re-evaluate the results obtained by Barclay and his associates, but as the work progressed it became evident that many technical factors were involved in investigations of this nature which might affect the conclusions to be drawn in a very definite

manner. In particular, the fact that Barclay and his associates used the observations made on postmortem or surgical specimens to interpret the blood circulation in the living may have constituted a source of serious error. The author, therefore, extended the experiments in an attempt to apply the method of microangiography also to living tissues. The results of these studies will be published later.

In the present monograph a detailed discussion is given of the theoretical and experimental basis of microradiography as applied in general and as used for the visualization of the minute blood vessels. The following pertinent problems are dealt with *in extenso:* (1) the production of roentgen images with high definition: (a) the geometry of the image formation; (b) microradiography with primary magnification; (c) microradiography with secondary magnification, which is the method adopted by the author; (2) the absorption of roentgen rays, the measurements indicating that 1 Å is the limit for the hardness of the roentgen rays which may be used in microradiography with secondary magnification; (3) equipment and experimental microradiographic technique: (a) roentgen sources; (b) cameras; (4) fine-grain photographic emulsions; (5) stereomicroradiography, a number of beautiful stereomicroangiograms being printed as anaglyphs at the end of the monograph and red-blue eyeglasses being provided in a pocket of the back cover for the reading of these prints; (6) roentgen contrast media, the author preferring neoprontosil and thorotrast for the injection of specimens, and umbradil for use in living animals.

The series of investigations by means of microangiography carried out on surgical and autopsy specimens revealed that no information can be gained by this method concerning the functional status of the blood vessels. Likewise, the author was unable to demonstrate the defects of the vascular pattern in excised human stomachs as reported by other workers.

The investigations in living animals were limited so far to the study of the minute vessels in the ears of rabbits. Although some undesirable side reactions were noted, it was believed that the method was of definite value. Experiments on the effect of cold on the rabbits' ears elicited the fact that in most instances there was no filling of the smallest blood vessels with the contrast medium (the earliest microangiograms were made 3 minutes after thawing), and that the failure of this filling is at least to some extent due to spasm occurring most probably in the venules.

An extensive bibliography is appended.

T. LEUCUTIA, M.D.

Radiumhemmet's Method of Treatment in Hypopharyngeal Cancer. SVEN HULTBERG. *Brit. J. Radiol.*, 1953, 26: 224.

The purpose of this lecture is to describe the radiotherapy of hypopharyngeal cancer at Radiumhemmet in Stockholm. The author has regarded as hypopharyngeal cancer all carcinomas arising from the external portions of the larynx and in the hypopharynx. They have drawn the line of division at the laryngeal inlet; that is, the edge of the epiglottis, the aryepiglottic folds and the arytenoid region. They have also grouped with hypopharyngeal tumors those numerous carcinomas which show a fusiform growth, with the center about the esophageal inlet at the level of the sixth cervical vertebra. They distinguish between cancer of the upper and the lower portions of the hypopharynx, drawing the line of division at the level of the upper border of the cricoid cartilage.

The upper group comprises carcinomas of the edge and the anterior surface of the epiglottis, of the aryepiglottic fold, the arytenoid regions, and of the pyriform fossa. Cancer of the laryngeal surface of the epiglottis, on the other hand, has been referred to the larynx.

To the lower group are assigned postcricoid carcinomas and the aforementioned tumors around the esophageal inlet. Tumors arising below the boundary are referred to the esophagus.

Surgical removal of an early carcinoma of the hypopharynx may be possible in skilled hands, but is a difficult and hazardous undertaking. Radium is seldom used. Local application of radium with the help of bougies is exceedingly distressing to the patient. External radiation with radium, either in the form of "collars" or from "radium bombs," may yield good results in patients having long and slender necks. X-ray therapy is the method of choice. The patient, on arrival at Radiumhemmet, is examined thoroughly. The size, extent, and site of origin of the tumor are determined as precisely as possible by means of roentgenologic examination, direct and indirect laryngoscopy and pharyngoscopy, and ordinary palpation. The tumor is carefully localized and marked out on the skin. Diagrams of the neck are plotted. A copper ring fitting the neck gives the shape and size of its outer contours. The center of the tumor is plotted on the diagram. This is done on the basis of measurements on the radiograph. Flexible leather indicators designed by Mattson have proved helpful in making the planning more exact. A crossfire technique, with two fields on each side of the neck, is used. The distance from the center of each field to the center of the tumor is also measured on the cross section, so that the tumor dose can easily be calculated. Doses are often checked by direct measurement. The portals are rather narrow, measuring about 3.5 to 4 cm. in width to about 10 to 12 cm. in length. The position of each field and the direction of a beam therefrom are determined at fluoroscopy.

The treatment is given with the aid of a special diaphragm which is readily adjustable to the curved skin surface and to the different sizes of the portals. The author uses from 170 to 180 kilovolts and 20 milliamperes, F.S.D. of 60 cm., with ½ mm. of copper plus 1 mm. aluminum filter. The daily dose, including backscatter, is 400 to 500 roentgens and the

intensity is about 50 roentgens per minute. During the first week 400 roentgens per day are used; the dose is increased if the size of the neck requires it to complete the series in about 1 month. One field is irradiated each day, thus giving a tumor dose varying between 150 and 250 roentgens. The total tumor dose required to produce complete regression of the cancerous growth is found to be about 5,700 to 6,200 roentgens administered over a period of 28 to 32 days. Each field will get a skin dose between 2,600 and 3,000 roentgens. A dry epidermitis usually results. A special arrangement of fields for treatment of carcinoma situated low in the hypopharynx is used. The treatment has to be modified in cases in which the patient is in poor condition, or where the tumor is large. In cases of lymph node metastases, supplementary treatment with teleradium from 1 to 2 portals is used. It is considered essential that the patients receive sufficient nourishment and fluids during the treatments. In carcinoma of the hypopharynx, if no treatment is given, about 50 per cent of the patients die within the first half year.

The results of treatment depend very much upon the condition of the patient. In one-third of the author's cases it was impossible to give a full radiation series. The results are calculated on all treated patients, including those in whom the roentgen therapy could not be completed. The 5 year cure is also calculated with respect to untreated cases. In the years 1939 to 1947 the authors treated 322 patients (119 males and 203 females) with hypopharyngeal carcinoma; of these, 36 have been alive and symptom-free for 5 years or more. The absolute cure rate is then 9.3 per cent and the relative cure rate, 10.9 per cent. The new method of beam direction by means of fluoroscopy has been used since 1943.

The author has included a group of patients treated during the years of 1948 and 1949, to demonstrate the increasing cure rate in the more recent years. The 5 year cure rate improved from 7 to 14.5 per cent of patients treated. Of the 65 patients treated in 1948 and 1949, 14 (22 per cent) are still symptom-free today; even palliative results have improved, as has the number of patients alive after 1 year, which is increased from 33 to 54 per cent. All patients who died from intercurrent diseases are counted as having died of cancer.

Concerning the results obtained, besides the fact that in as many as one-third of all of the author's patients the treatment could not be completed, the group comprising carcinomas in the upper part of the hypopharynx included 75 per cent localized to the pyriform fossa. This localization, as is well known, has a very poor prognosis. The 5 year cure rate in Radiumhemmet's series of carcinomas of the upper part of the hypopharynx is about 10 per cent in spite of the high percentage of unfavorable cases. In the lower part of the hypopharynx, carcinomas are usually regarded as incurable. Their 5 year cure rate, however, is 17.6 per cent in the group treated between 1943 and 1945. In the earlier group the corresponding figure was only 5 per cent. Lymph node metastases were found in 64 per cent in carcinomas of the upper part of the hypopharynx and in 50 per cent in those of the lower part. Only 4 of their patients with metastases have been cured and alive for more than 5 years. FRANK L. HUSSEY, M.D.

Dissection of the Neck after Intensive Irradiation to the Neck. Its Feasibility in the Management of Cervical Metastasis from Oral Cancer. S. GORDON CASTIGLIANO and C. JULES ROMINGER. *Am. J. Roentg.*, 1953, 69: 771.

The employment of irradiation prior to surgery is not a new idea. For many years small amounts of radiation (1 or 2 threshold erythema doses to the entire lateral neck) were delivered either before or after operation by various men in hope that some benefit would accrue. This method of treatment has gradually been abandoned. It is the purpose of the authors to describe a technique which, although not original, certainly is uncommonly employed, and to evaluate the feasibility of this approach from a technical standpoint. It is not their purpose to evaluate whether or not this technique is superior to other methods.

In the management of oral cancer with associated lymph node metastasis, it must be appreciated that if the primary lesion is to be treated by irradiation methods, the cervical metastasis cannot be left to go untreated while the primary lesion is being controlled. The technique employed in the radiation of the neck consisted of treating each lymph node metastasis separately with x-rays using a portal seldom to exceed by more than 1 cm. the diameter of the mass. The majority (65 per cent) of the treatment portals measured between 19 sq. cm. and 39 sq. cm. Only 15 per cent of the cases had portals measuring under 19 sq. cm. Twenty per cent had portals over 40 sq. cm. in area. In 59 per cent of the treated cases, only one portal was employed to treat a single metastatic mass. Twenty-four per cent of the cases required two portals; in 12 per cent three portals were used, and in 5 per cent four portals were used. Each portal was treated daily.

The average dose (measured in air) delivered to the cervical metastasis was 5,300 roentgens. The highest dose was 11,000 roentgens (in air). The average tumor dose in the series was found to be 4,300 roentgens, while the highest tumor dose was 10,533 roentgens. Forty-one per cent of the treated cases received a tumor dose of between 4,500 and 7,000 roentgens. In the series of cases studied, the average time to deliver an average dose of 5,300 roentgens (in air) to an average area measuring approximately 30 sq. cm. was 38 days. In only 65 per cent of the cases was the dose delivered in a period under 5 weeks. However, in 92 per cent of the cases the treatment time was approximately 2 months or less. The 42 patients who make up the irradiated group were selected because of the fact that they received irradiation prior to neck dissection.

The patients were operated on from 1944 to 1950. A control series of 33 patients subjected to neck

dissection who did not receive preoperative irradiation and in whom the condition was similar in origin and as to the extent of metastasis were compared. For example, in the nonirradiated group 18 per cent had cancer of the tongue and 29 per cent cancer of the floor of the mouth; in the irradiated group, the figures were 19 per cent and 24 per cent, respectively. Of the 41 patients who received preoperative roentgen therapy, 41.5 per cent were alive for varying periods of time without evidence of disease. Four without evidence of disease (10 per cent) were lost to follow up, and 5 died without evidence of cancer after varying intervals of more than a year. Fifteen of the 41 patients died as a result of cancer. Of the 32 with determinate cases, 17 are alive for varying periods up to 6 years without evidence of malignant disease (53 per cent). Thirty-two per cent are alive and well for periods of 3 to 5 or more years. Only 21 per cent of the patients in the nonirradiated group are alive and well for periods of 3 to 5 or more years compared with 32 per cent in the irradiated group. Of the living determinate patients, 43 per cent (compared with 55 per cent) are alive and well from 1 to 6 years. Of the patients receiving radiation therapy to the neck prior to neck dissection, 15 died directly or indirectly as a result of the primary malignant disease while in the other group 10 deaths were attributable to cancer.

It may be stated that if portals are used which are not too large—up to 60 sq. cm.—or doses are used which range from 4,000 to a maximum of 6,000 roentgens (in air), a radical neck dissection is a perfectly feasible procedure. The safe dose drops to 3,000 roentgens (in air) when the area reaches 70 sq. cm. Larger areas are not advised. The irradiation should be fractionated at a rate of 300 roentgens per day. Conventional deep roentgen therapy (200 kv., peak) was used in the cases. The interval after completion of irradiation to the neck to the time of operation should not be too long. The optimum time is within 3 to 6 weeks of the completion of radiation therapy or of the healing of the moist epidermitis. The authors strongly believe that irradiation methods alone are too conservative for the management of operable metastasis.

FRANK L. HUSSEY, M.D.

Radiation Burns from Diffraction Apparatus Simulating Infections. Report of Cases. R. M. WATROUS, HAZEL W. HODGES, and M. J. MCANDREW. *J. Am. M. Ass.*, 1953, 152: 513.

An x-ray diffraction apparatus is a valuable tool in ascertaining the molecular structure of many organic and inorganic compounds, and will therefore probably find increasing use in large research laboratories. As with all x-ray equipment, burns may result if proper operating instructions are not followed.

The author describes 5 radiation burns in 3 persons which resulted from the improper use of an x-ray diffraction apparatus for fluoroscopy of the fingers. This type of case is easily confused with infection, especially if any history of trauma to the part happens to exist. The injury has the typical appearance of a burn after the first week with the development of necrosis and a protracted period of healing. Such injuries may be confused with infection or thermal burns unless the physician elicits the true history. The patients rarely connect the x-ray exposure with the subsequent lesion.

FRANK L. HUSSEY, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

The Shoulder-Arm Syndrome. ANTHONY F. DEPALMA. *Bull. Hosp. Joint. Dis.*, N. Y., 1953, 14: 35.

Frozen shoulder is a clinical entity which is produced by muscular inactivity of the shoulder in individuals past 40 years of age. Bicipital tenosynovitis is the most common etiologic factor producing muscular inactivity leading to a frozen shoulder. Pain is the outstanding clinical feature of frozen shoulder. Once pain is eliminated restoration of function can begin. Conservative measures in early cases may abort the syndrome. In late cases transplantation of the tendon of the biceps muscle to the coracoid process will eliminate the pain factor and permit painless motion in the shoulder joint.

In this series optimum restoration of function was obtained in from 8 to 22 weeks. Manipulation of the frozen shoulder is a futile procedure; the only patients that benefit from this method of treatment are those in whom the biceps tendon is ruptured at the time of manipulation.

W. FOSTER MONTGOMERY, M.D.

Metastasizing Hemangiomas. A Case of Malignant Hemangioendothelioma. DAVID TIBBS. *Brit. J. Surg.*, 1953, 40: 465.

A case of malignant hemangioendothelioma is presented in which an angiomatous tumor preceded the appearance of multiple angiomas of the skin and other tissues. Typical of this type of case is the microscopic appearance which may lack obviously malignant histological qualities. Some writers have used the paradoxical description "benign metastasizing angioma" to describe the condition.

Our present knowledge indicates that a rapidly growing hemangioma should be regarded as a probably malignant hemangioma and that it should be subjected to wide surgical excision.

W. FOSTER MONTGOMERY, M.D.

A Case of Neurofibromatosis of Recklinghausen with Osseous Changes in the Tibia (Ein Fall von Neurofibromatosis Recklinghausen mit Knochenveraenderungen an der Tibia). R. KUEBLER. *Helvet. chir. acta*, 1953, 20: 122.

An 11 year old boy exhibited a thickening of the left lower leg since he was 4 years old. When he was 5 years of age tender nodules appeared on his left tibial crest and a skin thickening developed over the left wrist joint. There was also skin thickening over the left ankle joint with brownish discolorations of the skin. Later, there was noted an abnormal length of the left lower leg and a slight turning outward of the left foot. The child now limped but was free of pain and not noticeably disabled by the abnormality. Following an injury to the part a marked swelling of the entire left leg developed. The swelling and thickening of the tibial shaft did not respond to any form of treatment.

The roentgenogram showed a homogeneously shadowed, elongated, smoothly bordered tumor involving the middle two-thirds of the left tibia. The cortex of the bone itself was sharply delimited. The operation disclosed a subperiosteal neurofibroma of the tibial shaft with osseous cortex (periosteal reaction). The tumor was removed completely.

Histologically, the soft tissue component of the tumor mass was found to consist of fibrillary connective tissue with the inclusion of a few strands of nerve fiber. The fibrils were arranged concentrically or were irregularly interwoven, and they were stained reddish and yellowish with the van Gieson stain. In the superficial regions of the nodules bundles of myelinated nerve fibers were visible.

The periosteal cortical shell of bone exhibited spicules extending vertically toward the tibial shaft. The marrow spaces contained vascularized, fibrous marrow.

Three months later the tumor mass was observed to be reforming. No other bone changes were detectable in any other portion of the skeleton.

A study of the family disclosed maculae of brownish, cutaneous pigmentation and fibromas on the father's side of the family; however, the boy represented the only instance of bone changes.

The present case is thought to represent the most extensive bone involvement of this character that has been reported for this disease.

JOHN W. BRENNAN, M.D.

Cancer as a Chronic Disease. JOHN J. MORTON, JR., and JOHN H. MORTON. *Ann. Surg.*, 1953, 137: 683.

The unpredictable nature of cancer as a disease is demonstrated by a series of 17 case reports, each of which demonstrates a situation in which the patient had a long period of useful survival in spite of the fact that he had active malignant disease which had not been carefully eradicated.

The cases reported demonstrate conclusively that the chronicity is not confined to any particular type of cancer but that cancer in general may behave as a chronic disease. W. FOSTER MONTGOMERY, M.D.

Treatment of Fibrosarcoma. EDWARD S. STAFFORD and GRANT E. WARD. *Ann. Surg.*, 1953, 137: 639.

Because malignant neoplasms arising from fibrous tissue in the soft parts of the body are relatively uncommon, and because they differ in their behavior from the much more frequent malignancies of epithelial origin, the authors studied the results of therapeutic efforts in order to find out how therapy might be improved. Small lumps in the skin are usual occurrences. Since many are epithelial cysts of various types and other benign lesions, it seems

to be the practice of many physicians and surgeons to excise them locally with a small margin and throw them in the wastebasket, without microscopic examination. Then, when a recurrence develops, it becomes evident that the supposed benign lesion was actually a malignant one.

The authors believe that local excision without lymph node dissection is the best therapy currently available. Amputation is usually unnecessary and undesirable. The value of postoperative irradiation is questionable. Regular and careful follow-up examinations are essential and will lead, in many patients, to secondary operations which will prolong life and good health remarkably. Pulmonary involvement must be watched for and it seems likely that the removal of a solitary pulmonary metastasis is warranted. Experience apparently indicates that at least 4 of 5 patients with this disease can be treated successfully.

W. FOSTER MONTGOMERY, M.D.

EXPERIMENTAL SURGERY

Homotransplantation of the Dog Heart. H. G. DOWNIE. *Arch. Surg.*, 1953, 66: 624.

A series of 23 homotransplantations of the dog heart was done, the heart of the pup being anastomosed to the vessels of the neck of an adult dog. Such a preparation is really a viviperfusion and does no work, although the heart pulsated regularly for an average of 129 hours.

The ultimate failure of such a transplant depends on the usual biological reaction to a homotransplant. Some of the sections of the transplanted heart removed at the termination of the experiment showed remarkably little cellular infiltration, which suggested that a humoral agency was responsible for the destruction of the transplant.

W. FOSTER MONTGOMERY, M.D.

Contributions to the Study of Skin Homografts (Contributo allo studio degli innesti omoplastici di pelle). L. GALLONE, G. RADICI, and G. RIQUIER. *Chirurgia*, Milano, 1953, 8: 44.

The authors have carried on the original experiments of Fasiani (1922) who demonstrated, by means of injection of India ink, the rapid vascularization of both autografts and homografts within 2 to 3 days, but the development of sloughing and hemorrhage after 5 days in the homografts, with development of a normal circulation in the autografts.

The authors repeated this technique of India ink injection with simultaneous histologic and cytologic studies at the various stages of vascularization. They confirm the results of Fasiani and find that by the fifth day after grafting the autograft begins to have a normal cytological appearance, while the homograft has a gradually increasing cellular infiltration. By the seventh day the autograft presents a practically normal appearance while the homograft contains many lymphocytes which, after a few more days, are joined by large numbers of plasma cells. By the thirteenth day, at which time the graft is well on its way to being sloughed, there is present a large number of eosinophils.

The authors discuss the significance of these findings. They suggest that these migratory cells may provide the humoral or immunological mechanism by which a homograft is sloughed and may explain the reason that elevated antibody titers are not necessarily found in the circulating blood stream of the host.

GEORGE L. NARDI, M.D.